



C H E E T A L

JOURNAL OF
The Wild Life Preservation Society of India

I. U. C. N. SPECIAL ISSUE

Vol. 12

NOVEMBER, 1969

No. 1



IN THE SERVICE OF INDUSTRY

DELHI FINANCIAL CORPORATION

(Established by the Government Under the State Financial Corporations Act, 1951)

**SARASWATI BHAVAN, E BLOCK, CONNAUGHT PLACE,
NEW DELHI**

Chairman : S. C. VERMA, I.A.S., Chief Secretary, Delhi Administration

We advance medium and long term loans to Industries established or proposed to be established in the Union Territories of Delhi and Chandigarh.

ASSISTANCE SANCTIONED

UP TO 30.9.1969

Rs. 3.26 CRORES

ASSISTANCE DISBURSED

UP TO 30.9.1969

Rs. 2.36 CRORES

MINIMUM LIMIT OF LOAN ADVANCED:— Rs. 20 Thousand

MINIMUM LIMIT OF LOAN ADVANCED:—Rs. 20 Lakhs

In case of Public Limited Companies and Industrial Co-operatives.

Rs. 10 Lakhs

In case of Private Limited Companies, Partnerships and Proprietary Concerns.

Service of Corporation's staff available for completion of Loan application forms. Special incentives in the form of Concession in rate of Interest and Security. Margin are Available to Small Scale Industries.

T. L. KHURANA,
Secretary
Phone : 48607

L. N. SAKLANI, I.A.S.,
Managing Director.
Phone : 47054

CONTENTS

PAGE

1.	Foreword	...		
2.	Messages	...		
3.	President's Speech	...		
4.	Ourselves	...		(i)
5.	Editorial Notes	...		1
6.	Wildlife Photography in India—B.N.S. Deo	...		2
7.	A Mid-Winter Wildfowl Count at Kaziranga—M.J.S. Mackenzie	...		10
8.	Wildlife in Canada's National Parks—B. Seshadri	...		16
9.	The Southern Asiatic Gaur or Indian Bison—M. Khader Hussain	...		21
10.	Story of the Lion Census—R.S. Dharmakumarsinhji	...		29
11.	The Dudhwa Sanctuary—Kr. Arjan Singh	...		48
12.	India's Wildlife Heritage Faces Extinction—H.H. Yeshwantrao H. Ghorpade	...		57
13.	Tiger Preservation—A. Imam	...		61
14.	Kaziranga Through Sixteen Years—Dr. Robin Banerjee	...		64
15.	जगली हाथियों के बीच—रामेश बेदी	...		67
16.	Pugmarks of Tiger—A Study in Movements—Harish Chandra	...		69
17.	The White Tigers—K.S. Sankhala	...		73
18.	Some Observations on the Feeding Habit and Predators of Peafowl in Saurashtra— R.S. Dharmakumarsinhji	...		78
19.	Falconry—S.M. Osman	...		82
20.	Transplanting of Indian Lion in Uttar Pradesh—S.S. Negi	...		84
21.	The Jungle Fowl—C.L. Bhatia	...		98
22.	The Tiger in Uttar Pradesh—V.B. Singh	...		102
23.	Reproductive Pattern of Some Indian Mammals—K.S. Sankhala and J.H. Desai	...		106
24.	The Three Saddle-Backs—E.R.C. Davidar	...		114
25.	Himalayan Notes—Hari Dang	...		130
		...		135

26.	Wildlife in the Himalayas—Threatened from Kashmir to Assam—Hari Dang ...	138
27.	The Endangered Crocodiles of India—R.N. Misra ...	143
28.	The World Wildlife Fund comes to India—Anne Wright ...	149
29.	Students' Corner ...	151
30.	Reviews ...	156
31.	Correspondence ...	158
32.	List of Journals received on Exchange Basis ...	161

FOREWORD

On behalf of the International Union for Conservation of Nature (IUCN) I wish to congratulate the Wild Life Preservation Society of India on the important contribution being made to advance the cause of wild life conservation in India. CHEETAL is increasingly serving as a forum for preserving wild life as well as enlarging the efforts of conservationists to spread the latest knowledge of the wise use and management of this important game resource.

India is a great nation now facing a serious wild life crisis. It is fortunate in having the richest fauna and flora of any Asian country, which includes such a large number of spectacular but fast vanishing species. The great Indian rhinoceros, Asiatic lion, majestic tiger, Kashmir stag, wild ass, and the snow leopard are but a few of the endangered species that have suffered greatly from indiscriminate shooting, poisoning, and pressures on their native habitat.

Articles and books, as well as the voices of such experts as the late M.D. Chaturvedi the late E.P. Gee, and Salim Ali, have sounded the alarm. The Indian Board for Wild Life and other organizations have recommended specific action, but have so far failed to arouse a strong enough public opinion to carry out a program to effectively assure the survival of most of the endangered species. Great credit goes to those who brought about the establishment of the Kaziranga Sanctuary in Assam for the rhinos, and other parks and reserves to preserve the natural habitat and samples of Indian wild life found in those particular areas.

The IUCN particularly welcomes the heralding of our General Assembly, the first to be held in Asia, by the publication of this special enlarged issue of CHEETAL. We hope that our Assembly may be the launching pad for a great awakening of interest in India, as well as throughout the world, in developing action programs to save what is left of endangered species. In the words of the well known naturalist, William Beebe, "When the last individual of a race of living things breathes no more, another heaven and another earth must pass before such a one can be again."

Harold J. Coolidge,
President,
International Union for Conservation of Nature.

THE BIRD

On behalf of the International Union for the Conservation of Nature, I am pleased to welcome you to this meeting. It is a privilege to have you here, and I hope that you will find it a most interesting and profitable one. The purpose of this meeting is to discuss the conservation of birds, and to consider the various measures which may be taken to protect them. It is a subject of great importance, and one which concerns us all. We must do our best to preserve the birds of the world, for they are a part of our heritage, and they are also a source of great beauty and interest. We must do our best to protect them, for they are a part of our heritage, and they are also a source of great beauty and interest. We must do our best to protect them, for they are a part of our heritage, and they are also a source of great beauty and interest.

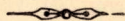
Harold J. Cogburn
President
International Union for Conservation of Nature

MESSAGES

Rashtrapati Bhavan,
New Delhi-4.
Sept. 27, 1969.

The tenth General Assembly of the International Union for Conservation of Nature and Natural Resources, which is being held in Delhi at the invitation of the Government of India, is an occasion for all of us to reflect on what we are doing in this direction. A country's wildlife is a precious heritage and nature has been specially bountiful to India in the number and variety of our birds and animals. This is the trust we hold for our future generations and it is our privilege and our duty to preserve it to the best of our ability. I am glad to know that the Wild Life Preservation Society of India is active in this important national cause and I hope it will receive the help and support it deserves. I send the members my best wishes.

V.V. Giri,
President.



New Delhi,
September 14, 1969.

Wild life is a gift of Nature which we have been recklessly squandering. But of late there is some little realisation that preserving wildlife is the mark of a civilised nation. In some countries, this realisation dawned after there was no wildlife to preserve. Fortunately, India still has wildlife in abundance. It is our duty to preserve this wealth and to ensure that animals in our forests are able to live naturally. I hope CHEETAL will also try to develop an interest and love for nature and wildlife in children.

My best wishes for the special issue of CHEETAL which is being brought out on the occasion of the Tenth Assembly of the International Union for Conservation of Nature and Natural Resources being held in New Delhi in November.

Indira Gandhi,
Prime Minister.

New Delhi,
September 8, 1969.

We are passing through a critical stage in the history of wildlife conservation in our country, and what we do now will largely determine the future status of our rich heritage which we are holding in trust for generations to come. Fortunately, wildlife conservation is now receiving increasing attention as a result of the efforts made by nature conservationists and the recent reactivation of the Indian Board for Wild Life at the initiative of the Prime Minister. However, wildlife conservation cannot be the duty of a few. It is the duty of each one of us to spread the message of wildlife conservation and help save our rich heritage from destruction, and for this purpose to enlist the sympathy and interest of the common man to appreciate the benefits of nature conservation.

National Parks and Sanctuaries play a very important role in preserving and protecting our precious fauna and flora. For the size of our country five National Parks and a little over a hundred Sanctuaries are inadequate. We need to create many more and protect them scrupulously.

On the important occasion of the I.U.C.N. meeting in New Delhi I appeal to you all through the columns of CHEETAL magazine, which is rendering valuable service in propagating measures for conserving wildlife, to respect the wildlife laws and regulations and desist from doing anything directly or indirectly which would violate them.

Karan Singh,
Chairman, Indian Board for Wild Life,
Minister of Tourism & Civil Aviation.

ARMY HEADQUARTERS,
New Delhi.
7th August, 1969.

All lovers of nature have viewed with increasing concern the tremendous devastation that has been inflicted upon wildlife during the past years. Steps taken by Government and other interested parties to preserve wildlife are, therefore, most opportune and welcome. I am glad to note that, CHEETAL, Journal of Wild Life Preservation Society of India, has contributed significantly towards enlightening our countrymen about the wonders and beauty of our wildlife and the need to preserve it.

It gives me great pleasure to send this Message and it is my sincere wish that your Journal flourishes and continues to serve and enlighten an ever increasing number of people.

General SHFJ Manekshaw, MC,
Chief of the Army Staff.

Raj Bhavan,
Trivandrum.

I am glad to learn that a Special Issue of "Cheetal" is being published in connection with the General Assembly of the International Union for Conservation of Nature and Natural Resources which is meeting at Delhi.

Though most of us are aware of the need for preservation of the fauna and flora of India, the fact remains that many species of both plant and animal life are becoming extinct due to wanton destruction. It is high time to adopt serious measures to prevent further encroachments on the treasure-house of nature.

The immediate necessity appears to be an all-out campaign to educate the masses on the urgency of the problem of preservation of all plant and animal life in order to maintain the balance of nature.

I wish all success to the endeavours of the Wild Life Preservation Society of India in this direction.

V. Viswanathan,
Governor of Kerala.

Raj Bhavan,
Poona.

I gladly send my good wishes to the Special Issue of "Cheetal" which the Wild Life Preservation Society of India is bringing out on the occasion of the tenth general assembly meeting of the International Union for Conservation of Nature and Natural Resources. If we take a long-term view, protection of animals and tending of natural resources has a bearing ultimately on the welfare and happiness of human society. That is why every thinking person must give full support to all endeavours in that direction.

I trust the deliberations of the Assembly Meeting will be fruitful and wish every success to this souvenir.

P.V. Cherian,
Governor of Maharashtra.

Raj Bhavan,
Shillong.

I am glad to learn that the Wild Life Preservation Society of India is bringing out a Special Issue of "Cheetal" to mark the X-General Assembly Meeting of the International Union for Conservation of Nature and Natural Resources at New Delhi from 24th November to 1st December 1969.

It is distressing to see the wanton destruction of rare species of wildlife in India as well as in other countries. I am glad that the Wild Life Preservation Society of India has been doing such good work for the preservation of wildlife and the conservation of natural resources.

I wish their work success and I send my best wishes for the success of Cheetal's Special Issue.

B K. Nehru,
Governor of Assam.

Bihar Governor's Camp,
Patna,

Conservation in time can make a difference between a desert and fertile land which can sustain human and animal populations. Even when forests are not denuded, the preservation of wild life is as important as the preservation of the forest itself. Though laws can help to a certain extent, the only protection of society can offer against destruction of wildlife, which results in disturbing the ecological balance, is in educating public opinion, which your society is doing.

Nityanand Kanungo,
Governor of Bihar.

Raj Bhawan Haryana,
Chandigarh.

I am glad to know that you are bringing out a Special Issue of "Cheetal" to mark the Tenth General Assembly of the I.U.C.N. and N.R. and wish all success to your efforts.

G.D. Malik,
Governor, Haryana.

Raj Bhavan,
Madras-22.

I am glad to know that the Wild Life Preservation Society of India is bringing out a souvenir number of its journal, "Cheetal", to mark the Tenth General Assembly Meeting of the International Union for Conservation of Nature and Natural Resources, to be held at Delhi this year.

I congratulate the Wild Life Preservation Society of India on the service it has been rendering in this worthy cause. In our vast country, there is variety of nature and natural resources. Wildlife is one of our national assets and it is our duty to preserve it from extinction. Wildlife sanctuaries in different States of India attract tourists, and preservation of wildlife is essential to promote tourism to derive benefit from it. Vigorous steps should, therefore, be taken in India to see that there is no decimation of our wildlife. This international meeting is bound to help in evolving proper ways of protecting our sanctuaries and in getting to know the practice and laws in other countries in regard to this matter.

I wish the meeting success.

Ujjal Singh,
Governor of Tamil Nadu,

Raj Bhavan,
Bhopal-3

I am glad to know that a souvenir number of the journal "Cheetal" is being published by the Wild Life Preservation Society of India to mark the Tenth General Assembly of the International Union for Conservation of Nature and Natural Resources which is proposed to be held at Delhi. In the process of urbanisation and development of industries in our country, it is necessary to ensure that the forests and the wildlife which inhabits in them are preserved since they constitute one of the valuable natural resources of our country. I trust that your journal "Cheetal" will serve in promoting and preserving wildlife and conservation of natural resources. I send my best wishes.

K.C. Reddy,
Governor,
Madhya Pradesh,

Raj Niwas,
Simla—4.

I am happy to know that the Wild Life Preservation Society in India is bringing out a Special Issue of its journal "Cheetal" on the occasion of Tenth General Assembly meeting of the International Union for Conservation of Nature and Natural Resources in Delhi this year.

I hope the journal would stress the need for preservation of wildlife, nature and natural resources in the country. In the face of dangers posed by increasing population and growing needs of people, due attention has to be given to this aspect also.

I wish the number a success.

K. Bahadur Singh,
Lt.-Gen. (Retd.),
Lieutenant Governor,
Himachal Pradesh.

Raj Niwas.

I welcome this Special Issue of "Cheetal" the Journal of the Wild Life Preservation Society of India, a Society that has been struggling against all odds for the last 12 years in its great task of preserving and conserving the natural resources of our country.

I wish there was greater realisation of the importance of wildlife to the economy of India.

A.N. Jha,
Lieutenant Governor,
Delhi.

Jaipur,
August 5, 1969.

I am glad to learn that the Journal of the Wild Life Preservation Society of India 'Cheetal' is bringing out a Special Issue on the occasion of the Tenth General Assembly of the International Union for Conservation of Nature and Natural Resources being held at New Delhi from 24th November, 1969.

I hope the Special Issue will contain useful information on wildlife in India and will prove interesting to the delegates to the Assembly as also to the general reader.

I send my best wishes for the publication.

Mohanlal Sukhadia,
Chief Minister,
Govt. of Rajasthan.

Bangalore-1,
August 22, 1969.

I am glad that the talented Editor of 'Cheetal', Shri Hari Dang is bringing out a Special Issue of the popular magazine on the occasion of the Tenth General Assembly of the International Union for the Conservation of Natural Resources in the last week of November 1969. Wild life preservation is our cherished desire. As the head of the administration of Mysore where we have large stretch of evergreen forests, we are doing our best to protect the denizens of forests. I am sure 'Cheetal' will give a new lead in the matter. I wish the Special Issue success.

Veerendra Patil,
Chief Minister,
Government of Mysore.

Calcutta,
August 23, 1969.

The Tenth General Assembly of the International Union for the Conservation of Nature and Natural Resources meets in New Delhi this November. In the land that gave birth to Buddha and Gandhi, where life in every form is sacred and is to be preserved, where nature and beauty are adored, we must do everything possible to conserve nature and natural resources.

I commend the work being done by "Cheetal" in this regard.

Ajoy Kumar Mukherji,
Chief Minister,
West Bengal.

Lucknow,
September 25, 1969.

I am happy to learn that the International Union for Conservation of Nature and Natural Resources sponsored by the UNESCO is holding its Tenth General Assembly in New Delhi from November 24, 1969. To-day we are facing an uphill task in conserving nature and the wild fauna on account of agricultural and industrial encroachments over the habitat of wild life. Wild life is important not merely from aesthetic point of view but also from the point of view of maintaining the balance of nature. It is also an economic proposition. I am sure the deliberations of the conference will greatly boost the wild life conservation in the country.

Wildlife has few friends. I am glad that the "CHEETAL" magazine published by the Wild Life Preservation Society of India is making commendable efforts in converting people into lovers of wildlife. I wish the magazine all success in its good work.

I send my sincere good wishes to the delegates of this conference and welcome them to this country. Our own State has some of the finest wild life sanctuaries like the Corbett National Park, and I hope the delegates will not miss the opportunity to visit these sanctuaries.

C.B. Gupta,
Chief Minister,
Uttar Pradesh.

Wildlife is a national heritage of which we are all very proud. It has survived the ages because of our reverence for Nature. However, of late, we have, out of sheer ignorance and indifference, neglected wildlife preservation in our country, with dire consequences. In this context the convening of the IUCN General Assembly and the Special Issue of CHEETAL will help to focus the attention of our people on wildlife conservation. Let us make up for our past neglect.

Agriculture, forestry and wildlife conservation go hand-in-hand. The development of one is impossible without the simultaneous development of the other two. Let us resolve to devote to this neglected cause the attention that it rightly deserves.

Rapid urban and industrial developments, extension of agriculture and construction of various projects, tend to shrink wildlife habitat. It is, therefore, all the more necessary for us to preserve our rich heritage for its intrinsic, scientific, economic and recreational value.

CHEETAL has played a very important role in moulding public opinion in favour of wildlife conservation and in disseminating knowledge of wildlife problems. I am confident that this Special Issue of CHEETAL will go a long way in projecting in proper perspective, this worthy cause in this country.

R.C. Soni,
Inspector General of Forests of India.

I am happy to learn that "Cheetal" has decided to bring out a Special Issue on the occasion of 10th General Assembly of the I.U.C.N. scheduled to be held in Delhi.

Our wildlife has suffered a great deal in the recent past. The fact that wildlife is a national asset and a material resource is realised by few. Public apathy, administrative difficulties and the lust of killing on the part of poachers, combined with rapid in roads into the habitats of wildlife have been responsible for the dwindling of our fauna.

Our wildlife has few friends and many enemies. The Wild Life Preservation Society of India is one of the few institutions which has taken up the cause of wildlife preservation in the country. Its journal "Cheetal" since its first publication in 1958, has been playing an important role in espousing the cause of wildlife in the Country. It has been successful, through its increasing circulation among students and the general public, in focusing the attentions of its readers on the problems that wildlife faces and their solutions. It has also offered informative and interesting material to its readers and has put forth some sound suggestions regarding wildlife management in the various parts of the country.

The efforts made by the Society and "Cheetal" in the cause of wildlife preservation are commendable. I offer my heartiest congratulations to "Cheetal" and wish it success in its noble endeavour.

T.N. Srivastava, I.F.S.,
Chief Conservator of Forests,
Uttar Pradesh.

I have to congratulate the Society for bringing forth special number on this occasion, which is a memorable one for all those who have at heart the preservation of wildlife as a means to maintaining the balance of nature. Especially, from the State of Tamil Nadu, where the Chital abound in the well known sanctuary of Mudumalai, the greetings to CHEETAL are full of warmth and affection. I wish that on this occasion a special study of the blackbuck in our country will be undertaken or initiated by your Society.

T. Jeyadev, I.F.S.,
Chief Conservator of Forests,
Madras-6.

I congratulate you for bringing out this Special Issue of "CHEETAL" on the occasion of the General Assembly of the I.U.C.N. in New Delhi. The main object of your journal has always been to help preservation of the Wild Life in India and in this direction it has played a very significant role by focusing the interest of its readers, influential public men and Government towards the importance of Wild Life to man and the country. Whatever little has hitherto been done in the country to stimulate action towards prevention of wanton destruction of the rich and valuable fauna of the country at the present critical stage is to a large extent due to the efforts of the men behind your journal. I have every hope that this special issue will attract the attention of the international experts on Wild Life whose good wishes, help and guidance will facilitate the furtherance of the noble cause for which your journal stands.

G.S. Dhillon,
Chief Conservator of Forests,
Punjab, Chandigarh.

I am glad that "CHEETAL" is bringing out a Special Issue on the occasion of the General Assembly of the I.U.C.N., which is being held in New Delhi. In our country, magazines on wildlife are very few. There is urgent need for large numbers of such publications, including those in regional languages, to combat the prevailing indifference of people towards our decreasing wildlife. I hope that this magazine, which is the mouthpiece of the Wild Life Preservation Society of India, will continue to serve the cause of the wildlife of the country, and spread the message of conservation.

Chief Conservator of Forests,
Orissa.

i am happy indeed to learn that CHEETAL, Journal of the Wild Life Preservation Society of India, is producing a Special Issue on the occasion of the general assembly of the International Union for Conservation of Nature.

It is a silver lining that someone, somewhere, is trying to build up the public opinion so badly needed, for the conservation of natural resources. CHEETAL has been an admirably brought-out Journal, serving this cause. I wish your Special Issue all success.

K.N. Mishra,
Chief Conservator of Forests,
Madhya Pradesh.

I am really delighted to hear that the Society is bringing out a Special Issue of CHEETAL in connection with the General Assembly of International Union for Conservation of Nature and Natural Resources.

At this critical hour, when the entire fauna of our country is facing a crisis any attempt aimed at educating the people away from destructive and delinquent tendencies is a welcome step. Several important species of our wildlife are practically on the verge of extinction, as a result of unprincipled sport, vandalism and greed. Posterity will legitimately nurture a grievance for having been deprived of the benefit of knowledge about a number of species facing extinction today.

Journalism being one of the most potent media in educating the public and bringing about awakening, and for mobilising public opinion, I am happy to realise that CHEETAL is going to occupy the rightful position in shaping the destiny of the wildlife of our country.

I earnestly wish your esteemed CHEETAL continued success.

N.S. Kaikini, B.Sc., A.I.F.C.,
Chief Conservator of Forests, (Development)
Mysore.

I am pleased to learn that the Wild Life Preservation Society of India, Dehra Dun, is bringing out a Special Issue of its esteemed journal CHEETAL to mark the General Assembly of the International Union for Conservation of Nature and Natural Resources.

I wish the Wild Life Preservation Society of India all success in its earnest endeavour to protect and preserve the Wildlife of this ancient land of India.

Mir Fazlur Rahman,
Assistant Conservator of Forests,
Bangalore-3.

It is very good news that you are bringing out a Special Number of CHEETAL for the forthcoming General Assembly session of IUCN in Delhi. I fear I am no good at 'inauguration messages'. But I want you to know how much I have always appreciated and admired the efforts CHEETAL has been making to arouse public interest in our wildlife and in the urgent necessity for saving what is still left. I am sure the IUCN meeting will give a substantial boost to the wildlife preservation movement in India.

Dr. Salim Ali,
Bombay.

The Palace,
Mysore.

I am glad to know that a souvenir issue of CHEETAL is being brought out to mark the X-Assembly Meeting of the International Union for Conservation of Nature and Natural Resources in Delhi, from 24th November to 1st December 1969. The Wild Life Preservation Society of India has done yeomen service in the field of preservation of wildlife which is our most valuable asset. I wish the Society all the best.

Jaya Khamaraj Wadiyar,
Maharaja of Mysore.

I have read CHEETAL for many years with pleasure and profit. It has rendered yeoman service to the cause of wildlife preservation in India.

For one who has been intimately associated for several years with the problems of wildlife preservation, it is sad to record that both governmental and private efforts for wildlife preservation in India fall far short of the actual needs. The result is that wildlife in India, once plentiful and abundant even as late as the nineteen thirties, is today a fast disappearing asset—so fast indeed that I fear that in next quarter century we will be able to see wildlife only in sanctuaries and zoos. I sincerely hope that efforts will yet succeed in reversing this trend,

Dr. M.L. Roonwal,
Ph.D & Sc. D, (Cantab), F.N.I.,
Vice-Chancellor,
University of Jodhpur,
Rajasthan.

The I.U.C.N., Morges (Switzerland)

X General Assembly Meeting, November 1969

NEW DELHI

What is IUCN?

The International Union for Conservation of Nature and Natural Resources (IUCN) is an independent international body whose membership comprises states, irrespective of their political and social systems, government departments and private institutions as well as international organisations.

IUCN represents those who are concerned at man's modification of the natural environment through the rapid spread of urban and industrial development and the excessive exploitation of the earth's natural resources, upon which rest the very foundations of his survival.

IUCN's objective

IUCN's main purpose is to promote or support action that will ensure the perpetuation of wild nature and natural resources in as many parts of the world as possible, not only for their intrinsic cultural or scientific values but also for the long-term economic and social welfare of mankind.

To further the objective the Union promotes:

AWARENESS through education, so that as many people as possible may understand the value and importance of renewable natural resources and appreciate the need to use them wisely. This includes the dissemination of information through the press, radio, films, and television and through the Union's own publications.

RESEARCH to discover the best measures for conservation and to advance the study of ecology upon which all practical conservation depends.

ASSISTANCE in providing technical data for the conduct of practical conservation programmes.

ACTION on a national and international scale, by enlisting the co-operation of governments and international agencies in support of conservation programmes as well as in strengthening legislation and improving its enforcement.

IUCN Meetings

The Union convenes a General Assembly every third year in order to act upon issues of current importance, and to serve as a forum for discussion of conservation problems. Between 1948 and 1960, biennial general assemblies were held in Fontainebleau (France), Brussels (Belgium), Caracas (Venezuela), Copenhagen (Denmark), Edinburgh (Scotland), Athens (Greece) and Warsaw (Poland).

PRESIDENTIAL SPEECH DELIVERED AT THE ELEVENTH ANNUAL GENERAL MEETING OF THE WILD LIFE PRESERVATION SOCIETY OF INDIA HELD ON 8TH NOVEMBER, 1969 AT DEHRA DUN.

Guests and Members:

I have great pleasure in extending to you a cordial welcome to the Eleventh Annual General Meeting of the Wild Life Preservation Society of India.

Before commencing the regular business of the Meeting, I would like to pay homage to Dr. Zakir Hussain and place before you the following resolution:—

“This Annual General Meeting of the Wild Life Preservation Society of India places on record its sense of sorrow and grief on the sad and sudden demise of the late Dr. Zakir Hussain, President of the Republic of India, who was a great patriot, educationist, administrator and the very embodiment of secular democracy that India is”.

The Society suffered a loss in the passing away of Dr. Bains Prasad one of the Vice-Presidents, who always gave freely of his experience, ability and time to the cause of wild life preservation in general and to our Society in particular. The following resolution may be passed:—

“This General Meeting of the Wild Life Preservation Society of India places on record its deep sense of sorrow and grief at the sad demise of Dr. Bains Prasad—an Honorary Member, Vice-President and a great benefactor of the Society—a fighter for the cause of wild life conservation—and conveys its sincere condolences to the bereaved family”.

I have pleasure in announcing that Shri V.V. Giri, President of the Republic of India has kindly acceded to our request to become the Patron-in-Chief of the Society.

This year is of great significance for the cause of non-violence as we are in the midst of Gandhi Centenary year and we will also be celebrating the 500th birth anniversary of Guru Nanak Devji, two apostles of non-violence. Let us, in this year prevent the killing of wild life with all our power and resources.

You have seen the audited accounts and the report of the auditors for the year ending March 31, 1969, and with your permission can I take it as read?

Much has happened since we last met. The Society has been gaining from strength to strength and has expanded its activities as well as consolidated the gains.

I am happy to tell you that 3 Patrons, 27 Life Members, 49 Ordinary Members, 7 Professional Members, 3 Educational Members, 2 Family Members, 1 Honorary Member and 38 Student Members joined the Society since we met last.

I make particular mention of Dr. Bernhard Grzimek of 'Serengeti Shall Not Die' fame who has been elected an Honorary Member of the Society and he has honoured us by accepting the same.

Through Dr. Bernhard Grzimek, Director of Zoological Gardens, Frankfurt (West Germany), the Society received 12 DBBL shot guns and 12 .315 bore rifles for distribution as rewards for outstanding anti-poaching work and a scheme has been worked out to distribute these weapons in consultation with the Chief Conservators of Forests of different States. The Society is grateful to Dr. Grzimek for this and with his further promised help we will be able to do our bit in preventing poaching and preserving our vanishing wild life heritage.

The Society and the cause of wild life conservation suffered a great loss in the death of its benefactor, the late Mr. M.D. Chaturvedi, retired Inspector-General of Forests. He placed the publication programme of the Society on a sound footing by donating to the Society the royalties of his two books 'Singh Parivar' and 'Panther on the Prowl' both published by the National Book Trust of India.

You will be glad to know that another book 'National Parks' by Shri K.S. Sankhala is under publication by the Society to mark the X General Assembly Session of the International Union for Conservation of Nature and Natural Resources which is to be held at Delhi later this month.

The Society is also publishing a special issue of CHEETAL on this occasion and we have received a grant of 500 Dollars for this purpose from the World Wild life Fund through the efforts of Dr. Harold J. Coolidge, President of the I.U.C.N. for which we are most grateful

The Society was host to a group of Members of the Fauna Preservation Society, London, who visited Dehra Dun during March, 1969 and showed them the wildlife of Rajaji and Motichur Sanctuaries.

Being an organizational Member of I.U.C.N., the Society will participate at the I.U.C.N. Conference at New Delhi and acquaint the I.U.C.N. with the wildlife picture in India.

The World Wild Life Fund of which H.H. Maharaja Fateh Singh Rao Gaekwad of Baroda is the international trustee, will shortly launch the Indian National Appeal for this fund, and I wish to appeal to you all to donate generously to protect flora and fauna which is fast dwindling.

The Society is now represented at the Indian Board for Wild Life through its Honorary Secretary. The Society is endeavouring to convert CHEETAL into a quarterly. The Executive Committee of the Indian Board for Wild Life, at its last session, has decided to help us in this, and to utilize it for their publicity instead of issuing a News Letter. This is likely to place additional responsibilities on us. We should put in our efforts to make the CHEETAL one of the best wildlife magazines. To accomplish this all of us will have to work

very hard to secure financial resources, the co-operation of wildlife enthusiasts and the help of other organizations.

We also contemplate starting a training course in nature conservation and wildlife management.

You will also be glad to know that the Society has opened a Branch in Delhi and the North East India Branch of the Society at Shillong and the Bihar Branch have been activated. The North East India Branch issued an appeal to prevent bombing and dynamiting of rivers for fish.

The Society has embarked on other programmes. One being the exhibition of wildlife films at Clubs, educational institutions and also for the benefit of the members of this Society. For this we are badly in need of a 16 mm sound projector, a slide projector and an epidiascope.

The wildlife picture in the country is none too bright. The U.P. Wild Life Bill, drafted two years ago is still pending. But U.P. will be having more sanctuaries in the near future. It was the first State to establish a National Park in India—Corbett National Park. It also has a separate wildlife section within the Forest Department. Alarming news reaches us about the endangered Kashmir Stag—the swamp deer of Kanha—the rhinos of Assam and the Himalayan wildlife in general. Legislation for protection of wildlife is ample and well-intentioned but the implementation is lacking. Without strong enforcement of these wildlife laws and rules the fate of these animals is doomed. The need of the hour is the drawing up of a clear, definite and purposeful wildlife policy and its proper implementation.

The Society offers 'Corbett Essay Prize' for wildlife essay contests from local educational institutions and student members of the Society.

At the last Annual General Meeting, our Chief Guest Dr. A.N. Jha, Lt.-Governor, Delhi, donated Rs. 1,250.00 to the Society. In appreciation of the keen interest which Dr. Jha is taking in wildlife, the Society had decided to hold essay competitions on wildlife for student members and for the general public. More funds are being received for this purpose and we hope to award prizes of substantial value annually.

We have been receiving generous donations from the Rotary Club, Dehra Dun, Colonel Brown Cambridge School and many others, and we are grateful to them.

To inculcate the habit of wildlife preservation in our coming generation, it is essential that the subject of wildlife should be made a part of the curriculum in schools and colleges so that the urgency and importance of it is made explicit to them.

Another important credit to our society has been that Nehru Memorial Foundation has put the Society on the list of Institutions of National importance for processing and recommending applications for award of Nehru Fellowships. The Society recommended the

application of Shri K.S. Sankhala for a study of the endangered Indian Tiger and you will be glad to know that our recommendation was accepted and the Fellowship has been awarded to Shri K.S. Sankhala. This study is bound to lead to a greater knowledge of the biology of the Tiger.

My appeal to the members is that they should do their bit in enrolling members, securing donations and advertisements for the CHEETAL, and thus promote the cause for which we all stand.

I am grateful to the office bearers and the staff, the Executive Committee, the Working Sub-Committee, and the Editor of CHEETAL for their full co-operation without which we could not have achieved the measure of success that we have.

I thank Mr. R.C. Kaushik, President, F.R.I. & Colleges, Director of Forest Education and the Principal, Northern Rangers College for permitting us the use of the Forest College premises for holding this meeting.

I thank all members and guests for making this meeting a success.

CHEETAL

Journal of The Wild Life Preservation Society of India

VOL. XII

NOVEMBER, 1969

No. 1

Ourselves

The twenty-second issue of CHEETAL signifies a breakthrough in our efforts at serving the Cause of conservation in India. Generous support from the World Wildlife Fund, and advertisements from our well-wishers, have made it possible for us finally to bring you the kind of CHEETAL which shortage of funds has always prevented. This Special Issue, almost twice the normal size, more profusely illustrated, is our token of welcome to the International Union for Conservation of Nature and Natural Resources, which is holding its 10th General Assembly and 11th Technical Meeting in New Delhi from November 24th. to December 1st this year, in the Vigyan Bhawan.

This is the first time that the IUCN is meeting in an Asian country, and we have great hopes that its deliberations, and our Government's enlightened awareness of the problems, will lead to the implementation of, however belated, measures for saving our wildlife and the entire natural ethos of this sub-continental peninsula, and associated mountain ranges.

With so much original material on wildlife problems to choose from, we have tried to include a representative selection to highlight all our problems. This has meant keeping editorial matter to a minimum.

We hope our faithful subscribers without whose co-operation we could not survive, as well as our honoured guests, the delegates to the IUCN Assembly and Meeting, will find in our pages readable as well as valid proof of the determination of Indians in all walks of life not to let negligence and indifference destroy our natural heritage.

*

*

*

*

In welcoming the IUCN to India, we do no more than our host's duty, but we also feel pleased to be numbered among the three organisational members of this premier International organisation in this country. Thus we welcome our own colleagues in this task to which we are mutually pledged. May their efforts and our's be crowned with success.

Editorial Notes

The Indian Board for Wild Life:

The I.B.W.L. last met in 1965 at Corbett Park. Not only had it been since reconstituted, much else had happened in the field of Indian wildlife. The VII Session of the I.B.W.L., which was held in New Delhi at Vigyan Bhawan on July 8th and 9th, had thus aroused optimistic expectations. These were more than fulfilled by its action-minded and dynamic sessions, under the Chairmanship of Dr. Karan Singh, Union Minister for Tourism and Civil Aviation, and himself a knowledgeable and enthusiastic lover of wildlife and nature. Many of the familiar faces were missing, and the devoted services to the Cause by H.H. Maharaja of Mysore, and the late E.P. Gee, and the late M.D. Chaturvedi were particularly appreciated.

Sri Jagjivan Ram, Minister for F.A.C.D. and C., welcomed the Prime Minister, the Chairman, and the members of the Board, and the Prime Minister, Smt. Indira Gandhi then inaugurated the Session. Dr. Karan Singh and the Minister of State for F. & A., Sri A.P. Shinde, addressed the gathering, after which the Board began the item-wise consideration of the heaviest Agenda ever undertaken at such a Session. The significant decisions taken are mentioned below, as detailed reports of Minutes would run into fifty pages:

Executive Committee:

It was decided that an Executive Committee would replace the old Standing Committee, consisting of only thirteen members, with more being co-opted as necessary. This Committee would meet at least twice between each I.B.W.L. meeting, which latter would meet every year, by turn in each of the four major regions of India, the next meeting being scheduled for the Eastern Region, Assam for perference.

Membership of the I.B.W.L.:

The Chiefs of the Army Staff and the Air Force, as well as a representative of the Wild Life Preservation Society, were also recommended for membership.

*

*

*

Publicity and Literature:

It was recommended that literature and pamphlets, as well as some form of Newsletter, be published as advisable, and the Executive Committee will work out the details.

Poaching and Game Meat:

All transactions in game meat were recommended to be banned, and poaching was to be altogether suppressed.

Wild Life Ecology Branch at the F.R.I.:

This was decided upon at earlier meetings, and the Board was informed that Mr. Chaudhri of the Orissa Cadre of the I.F.S. had been posted to start this at the F.R.I. in Dehra Dun.

National Parks and Wildlife Sanctuaries:

It was recommended that more sanctuaries should be formed, and an inventory of wildlife resources all over India should be conducted by a small 'expert' committee, to be nominated by the Executive Committee.

Wild Life Departments:

These were recommended within the Forest Departments of each state of the Union of India, and were also to look after wildlife outside forest areas.

State Wild Life Boards:

Their formation in each state was recommended.

Export of Animal Products:

It was recommended that the ban on export of tiger and panther skins should be made more effective by making compulsory the registration of such skins in the possession of people, so that pre-ban commitments do not grow. Even sale within the country was to be controlled by making each skin sold obligatorily certifiable by a Deputy Conservator of Forests as having been shot legally.

Tourism:

1. Training to tourist guides in wildlife areas should be imparted by the Tourist Department, and the services of forest officers for lectures should be enlisted.

2. Facilities for tourists in National Parks and wildlife areas, and for photographic safaris should be increased, but in such a way as not to blemish the landscape.

Zoo Management:

It was decided by the Zoo Wing of the I.B.W.L. that Himalayan species should be bred where possible, (as in Kufri—Ed.) and exhibited in the plains after creating necessary environmental conditions.

Bird Wing:

Among the recommendations of the meeting of the Bird Wing were a study of the ecology of the Western Tragopan pheasant by the Himachal Pradesh Forest Deptt., which already has a pheasantry for the purpose.

*

*

*

Prime Minister's Letter to Chief Ministers of States:

It is understood that Smt. Indira Gandhi sent a letter to all Chief Ministers in July soon after the meeting of the I.B.W.L.

Referring to the serious situation revealed by the deliberations of the I.B.W.L., she called upon Chief Ministers to take personal interest, "because it is only when leaders take a personal interest that things get done". She further suggested the enactment of wildlife legislation on the lines of the Maharashtra Wild Birds and Animals Protection Act, and the creation of separate wild life units in state forest departments to enforce legislation in the field.

Other measures suggested by the Prime Minister were:—Constitution of State Wild Life Boards after the pattern of the I.B.W.L., curbing of all transactions in game meat, survey of wildlife resources, increase in the area under sanctuaries, and instructions to all District Magistrates and S.P.s to organise District Wild Life Boards to enforce wildlife rules in non-forest areas.

She concluded "What we do in the next five or ten years will determine the future and how the future will judge us."

*

*

*

Management and Preservation of Wild Life:

Suggestions by Shri S.S. Negi, Exec. Vice-President, WLPSI

- (1) Sports licences should be registered with the W.L. Wardens for shooting in the reserved forests on payment of a registration fee of Rs. 10/- per annum and with the District Magistrate for shooting in areas outside the reserved forests on payment of a fee of Rs. 2/- per annum.
- (2) No person who has not registered his licence with the W.L. Warden should be eligible for a shooting permit.
- (3) The number of persons in a shooting party should be restricted to the maximum of six.
- (4) The permit holders should be made to sign a pledge.
- (5) No person who has not registered his sports licence with the W.L. Warden should accompany the permit holder for shooting purposes.
- (6) Shooting permits in future should be issued by the W.L. Wardens.
- (7) Application for shooting permits should be accompanied with a fee of Rs. 5/- which will not be returnable.
- (8) Forest Officers not below the rank of Gazetted Officers should be invested with summary powers to deal with offences against W.L. Rules inside the reserved forests and civil officers not below the rank of Dy. Collectors outside the reserved forests. If this is

not possible, then all cases against breach of the Act and Rules should be tried by a Summary Court.

- (9) The penalty for breach of Act and Rules should be upto Rs. 500/- in addition to confiscation of arms, skins and horns, and cancellation of arms licence.
- (10) Crop protection licences should be restrictedly issued and barrels of guns issued for this purpose should be restricted to 18" or 20".
- (11) Sale of Buck-shots (large and small graph shots) by Arms and Ammunition dealers should be banned.
- (12) Sale of meat of wild animals and birds in hotels, restaurants, cafes and meat shops should be banned and a directive to this effect should be issued to the Municipalities for its strict enforcement.
- (13) There should be stricter control on the plying of motor vehicles on Forest Roads between sun-set and sun-rise.
- (14) Pet and Trophy dealers and Taxidermists should be licensed on payment of a fee of Rs. 50/- per annum.
- (15) Regional Closures and declaration of certain species of wild animals and birds as protected should be done as necessary.
- (16) The Rules for shooting in the Hill areas should be brought on the lines in force in other areas.
- (17) Rewards for catching offenders should be given.

II—Management of National Parks and Game Sanctuaries

- (1) National Parks and Sanctuaries should be formed in suitable and accessible areas to develop tourism and necessary amenities should be provided to attract tourists and students to see and photograph wild life in its natural setting.
- (2) Sanctuaries or W.L. Reserves should be established in suitable areas in every forest division for the protection, nursing and development of wildlife. In the plains, the areas already afforested or to be afforested by the Forest Department under the afforestation schemes should be declared as Sanctuaries.

III—Development of Shikar Facilities

- (1) Shikar facilities should be developed in the reserved forests to attract Indian and Foreign tourists interested in big game shooting.
- (2) Arrangement of Shikar trips for Foreign tourists should be done through Shikar companies. Such companies should possess the requisite arrangement and equipment

to run the shikar trips efficiently. Recognition to Shikar agents should be given on the recommendation of the Chief W.L. Warden.

- (3) Government servants interested in shooting, viewing wild life and photographing it, should be encouraged to visit forests. They should be allowed concessions in the form of reduction of shooting fee, bungalow fee, elephant fee, etc.

IV—Publicity and Propaganda

- (1) State Wild Life Board and District Wild Life Boards should be set up.
- (2) Honorary Game Wardens should be appointed to help the Game Wardens in educating public opinion in favour of wild life and preventing illicit shooting.
- (3) Documentary films, posters, leaflets, attractive charts and pictorial maps should be prepared and displayed in schools and colleges, exhibitions and in other places of public importance.
- (4) Radio talks and film shows should be arranged.
- (5) The Act and Rules on Wild Life should be prescribed for Departmental Examinations for the Forest Officers, as well as for the officers of the Revenue and Police Departments.
- (6) A booklet containing the U.P. Wild Animals and Birds Protection Act, Shooting rules, Close periods for wild animals and birds, and information on Shooting rules and permits should be printed and supplied at a nominal cost of Re. 1/- each.
- (7) A wild life museum should be established at all State capitals.
- (8) For carrying out publicity and propaganda in a proper way, a publicity section consisting of an officer experienced in publicity work, a photographer, an artist and a draftsman with necessary equipment, should be attached to the Chief W.L. Warden at the capital. This section should do the publicity of all the activities of the Forest Department including wildlife.

If the measures suggested above for the preservation and protection of wildlife are implemented in a fresh way it will be necessary to recast the Wild Animals and Birds Protection Acts and Shooting Rules on the lines of the Bombay Wild Animals and Birds Protection Act and Rules 1951.

Threatened Species

The Red Data Book of the I.U.C.N., edited by Noel Simon, lists only 17 species as 'endangered' within or near about Indian confines. These are as under:

Many of these suggestions, we are pleased to report, were also recommended by the I.B.W.L. and some States have already enforced them, including U.P., the state where Shri Negi was incharge of wildlife, and he was responsible for their successful implementation.]

1. The Giant Panda, the well-loved emblem of the World Wildlife Fund. This six-foot-long, bearlike, panda, *Ailuropoda melanoleuca* (David, 1869), is confined to a longitudinal distribution of 175 miles between Yehli, where Theodore Roosevelt shot his trophy, to Wen-Chuan, all in the Min River area of Western Szechwan and Eastern Sikang. It is not considered 'endangered', as even the Chinese authorities are protecting it.
2. The Malabar Civet, *Viverra Megaspila civettina* (Blyth, 1862), is confined to the coastal district and Western Ghats of Southern India, and is nearing extinction.
3. Asiatic Cheetah, *Acononyx jubatus*, is extinct within India in the wild state.
4. Asiatic Lion, *Panthera leo persica* (Meyer, 1826), was estimated at 162 in 1968, confined to the Girnar forests of Saurashtra in Gujerat.
5. Snow Leopard, *Panthera uncia* (Schreber, 1776), lives in the timberline regions of the Himalayas and associated mountain ranges, and was estimated at 400 ± 200 in 1967.
6. Indian Wild Ass, *Equus hemionus khur* (Lesson. 1827), in the Little Rann, still survives to the number of 800 at the last estimate, though there were over 3000 at Independence.
7. Tibetan Wild Ass, *Equus hemionus kiang*, (Moorcroft, 1841), the largest of the wild asses, is still found in Ladakh, Nepal, Sikkim (Chumbi ?), Tibet to Koko-Nor, and no estimate of its present population is available.
8. Great Indian Rhinoceros, *Rhinoceros unicornis*, (Linnaeus, 1758), is estimated to survive in nearly 740 animals in Nepal, West Bengal and Assam.
9. Pygmy Hog, *Sus salvanius*, (Hodgson, 1847), has not been seen for some time, and may well be extinct already, but reports kept coming from the Darrang district of Assam till as late as 1959.
10. Swamp Deer, *Cervus duvauceli*, (Cuvier, 1823), is estimated at between 3000 and 4000, but the 'Branderi' race of Madhya Pradesh is in some danger of extinction.
11. Manipur Brow Antlered Deer, *Cervus eldi*, (M'Clelland, 1842), is restricted now to the Logtak lake in Manipur state, and is estimated at 100 in numbers.
12. Kashmir Stag, *Cervus elaphus hanglu*, (Wagner, 1844), has been declining in its preferred bastion of the Dachigam sanctuary, but is also found in Kishtwar and the Chenab valley in Himachal Pradesh. Its numbers are in the region of 150 to 200. Studies on this species are urgently needed, as it is in danger of extinction.
13. Shou, or Sikkim Stag, *Cervus elaphus wallichi*, (Cuvier, 1823), was reported extinct for many years, but reports keep coming from the Bhutan-Sikkim and the Kameng-Bhutan border areas of stray animals, and these need to be varified before extinction is pronounced on this unique species.

14. Wild Yak, *Bos grunniens mutus*, (Przewalski, 1883), is confined to Northern and N-E Tibet, and is protected by Chinese authorities, but is in some danger of extinction.
15. Golden Takin, *Budorcas taxicolor bedfordi*, (Thomas, 1911), is still found in fair herds in Laya-Lingshi in Bhutan, in Tirap and Luhit in NEFA, but information available is meagre.
16. The Szechwan Takin is akin, and confined to North-Western Szechwan.
17. Nilgiri Thar, *Hemitragus hylocrius*, (Ogilby, 1838), is down to 400 or so animals in the Annamalais and the Western Ghats southwards and is being studied by Dr. Schaller & Mr. Davidar.
18. Red Goral, *Nemorhaedus eranbrooki*, (Hayman, 1961), is confined to the Nishmi Hills and N-W Burma.

Although these eighteen species are being kept under close watch by the I.U.C.N., we feel that several more should be added to the list, before it is too late to save them in substantial numbers. Musk deer, Pir Panjal race of markhor, *Ovis ammon* or Nayan (argali), and the serow are equally endangered. Each of these occur in the Himalayas, and their plight highlights the need for studies of Himalayan fauna.

Research Projects:

It might be useful to map out areas of ecology in India where wildlife research work is needed. Whether it is Indian field-workers, foresters and zoologists, or experts and scholars from abroad, we must stop picking arbitrarily from the rich mine of ignorance, and give a rational and considered bias to such projects.

Though all species endangered need special studies to devise techniques for their survival, we give below some urgently needed specific projects:

Swamp Deer:

Cervus duvauceli branderi of Madhya Pradesh has been decreasing in its already very critically low numbers over the years in the Kanha National Park. Some ecologists have suggested that it has lost its breeding 'zest', others blame diseases, infant mortality and poaching. Whatever the real cause, it is not obvious, and we are glad to note that the Chief Conservator of Forests of M.P., as well as I.U.C.N. and the I.B.W.L. are fully aware of this problem. It is in such a case of complex scientific problems that we should not hesitate to enlist the expert help of foreign ecologists like Dr. George Schaller to find a way to save the sub-species.

Tranquillisation Techniques:

The appropriate dosages for the larger mammals of India have never been worked out scientifically by a qualified physiologist with a background of ecological expertise, though

these figures are readily available in texts on the fauna of other regions. The present President of the I.U.C.N., Dr. Harold Coolidge, did pioneer work in this field, and here again it seems obvious that we will need foreign expertise to work out a table of dosages suitable for our wildlife. Forest officers could be attached to an expert from abroad, if none were available locally, and the use of tranquillisation techniques should be part of the course of the wildlife ecology branch of the F.R.I.

Threatened Species:

These, of course, should be the subject of detailed studies, but wherever possible Indians with specialised knowledge should be used for such studies, especially in areas which are strategically sensitive. For instance, the Nilgiri Thar needs to be censused and its ecology studied, if we are to save it. The Sikkim Stag must be the subject of another study, to determine first whether it is finally and definitively extinct, and to investigate rumours of its survival. The Kashmir Stag, the musk deer and others of the threatened species similarly must claim our first concern.

Floristic Studies:

The fauna rely on the flora for their diet, habitat and studies of the flora and the vegetation must precede work on new sanctuaries and must accompany research on wildlife.

It is gratifying to note that we already have several capable workers in the field, some sponsored by the Nehru Fellowships, others by their departments and some working independently, but co-ordination is lacking. This can be usefully provided by the new I.B.W.L.

Wildlife Photography in India

By

B.N.S. DEO OF KOREA, M.A., L.L.B., A.F.I.A.P.

India is one of those countries in the world which can boast of a rich fauna; wildlife which is both spectacular and varied. Nature has so blessed it that no matter where one is, our country's beautiful birds and animals are not far from us. Considering this, it is a matter of great regret that we have so few wildlife photographers in our country. I can find only 2 reasons for this:—(i) Few of us have the desire to go to the forests or lakes, and (ii) The average man considers this branch of photography too specialised, and expensive equipment necessary.

The first is a question of personal likes and dislikes with which one can not quarrel, but the second is not entirely true. Some very fine photographs of birds in their natural surroundings have been taken with simple cameras without any accessories except the electronic flash. The same is true of wild animal photographs and I have seen very admirable work done with an ordinary 35 mm camera with nothing more than a 135 mm telephoto lens.

India is a vast country and climate and habitat change rapidly. This is not a thorough or exhaustive article covering every aspect and every place. Bird photography is referred to only in general terms and Himalayan wildlife photography is not even mentioned. I have never done the latter and can not write about it from personal knowledge.

Photographing wildlife is a fascinating hobby where every species presents a difficulty and challenge that is unique in its own way. It is definitely more rewarding and satisfying to have a beautiful photograph of an animal on the wall than the dead, stuffed trophy. The first is a greater prize, in getting which, the photographer gets more excitement than the hunter with the rifle or gun.

Speaking in wildlife terminology, it may be correct to say that there are two 'species' of wildlife photographer. The first is the photographer to whom the photograph is of prime importance and the natural history aspect only secondary. The second group consists of persons who are naturalists first and photographers only in consequence. Both complement each other as the aim of nature-photography is to make the photographer a better naturalist and to make the naturalist a better photographer !

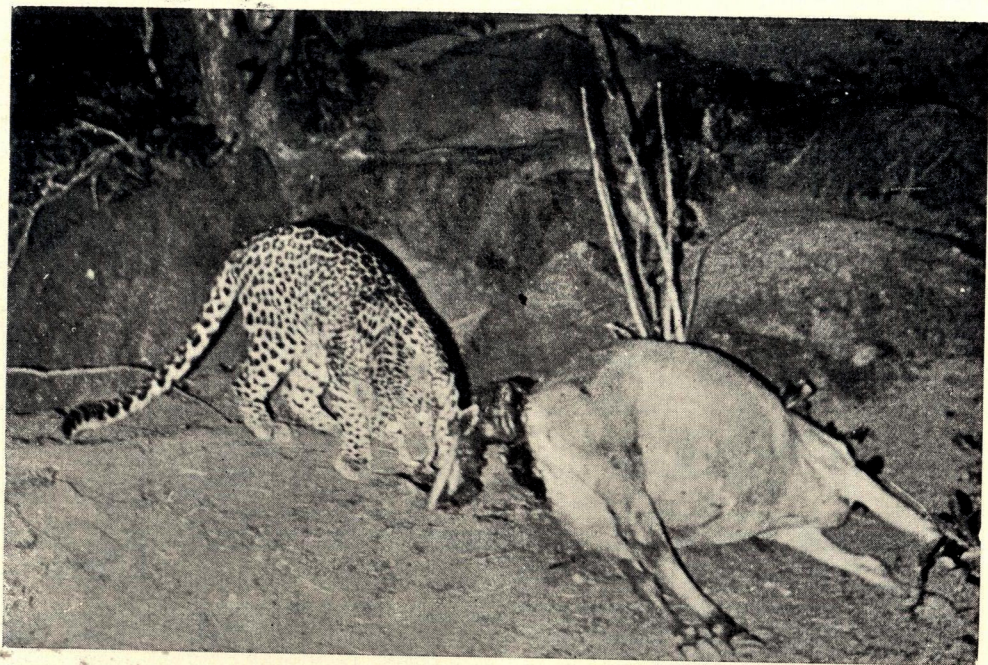
Although there have been individual photographers who took wildlife pictures off and on, wildlife photography of animals in India really started with F.W. Champion. His



Gaur at Salt Lick



Gaur (*Bos Gaurus*)



Panther on Natural Kill



Wild Tusker Emerging after Bath

pictures are superb and unmatched even today although they were taken in the twenties when cameras, apparatus and film were primitive in comparison.

As photographers and the general public have more intimate knowledge of African wildlife through excellent films and illustrated books, a comparison will ensure a better perspective. Photographing wild animals in India is far more difficult than in Africa. The reason for this is that the concentration of wild life in Africa is much greater than in India and that Africa has larger number of species of antelopes and deer which inhabit open country, where photography is comparatively easier. In India the area where the animals are found is heavily forested, which puts limitations on visibility and photography, besides making the lighting conditions difficult. Lastly, many Indian animals are nocturnal, whereas most African animals move about openly in the daytime.

There are various ways of photographing wild animals in their natural habitat, and each has its own advantages and drawbacks. Let us consider them.

Walking or Stalking

This requires a good knowledge of the forest and locality where one is working and familiarity with the habits of all wildlife found there. Without the former one would lose one's way, and without the latter it would be dangerous trying to get pictures, particularly of the bigger and dangerous animals. Not close enough with chital and sambar, is too close to a lone tuskar! A genuine desire to be in the forest and a good stamina for walking long distances are prerequisites for those who pursue this method. Photographing under these circumstances, early morning and early evening are the best times. Most animals feed at this time and an unnoticed close approach is possible. More than this, however, one can, at these hours, avoid the sun shining through the deciduous forest from directly above, which gives very patchy lighting. This to my mind is one of the greatest handicaps the photographer has to overcome when taking photographs in the jungle. Stalking is capable of giving very good results if one is lucky. The one very real drawback of photography from the ground is that many impediments like grass, twigs and branches come between the photographer and the subject. These do not allow a clear view of the whole animal, which is desirable in a good nature photograph. Working as we invariably are at almost maximum aperture, the telephoto lenses with their limited depth of focus, make these branches and twigs appear as out of focus lines and blobs, which mar what would, otherwise, have been a good photograph.

Photography from Elephant-Back

I have found this very good for photographing elephants, bison, rhino, sambar and chital. These species are accustomed to seeing the wild elephants in their natural habitat, and the presence of a tame one is taken for granted. Sometimes it is possible to approach

quite close by this method, as the animals are not alarmed. From an elephant, a much clearer and fuller view of the animal to be photographed is possible as branches, grass and twigs can not come in the way at this height.

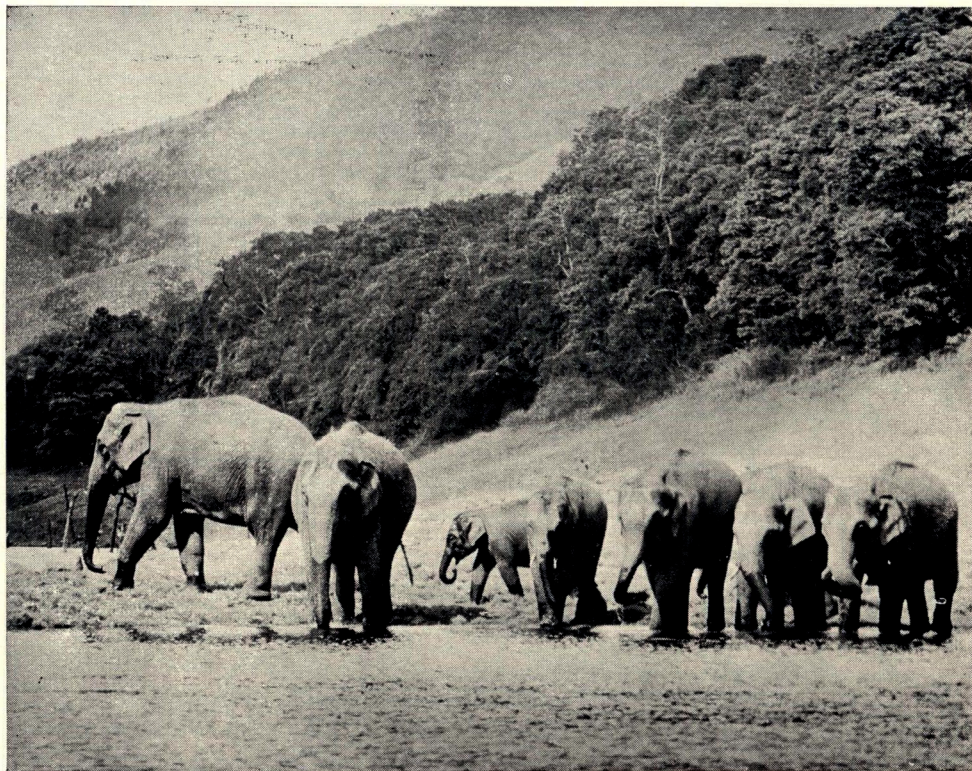
Sitting on an elephant with only a pad is at best a precarious perch. Besides taking pictures, some thought has to be given to keeping one's balance! Because of this, much or heavy camera equipment can not be carried. Telephoto lenses that are heavy or long are more of a hindrance than an asset under these circumstances. Compact tele-lenses are ideal for 'shooting' from elephant-back. Fast shutter-speeds, possibly the fastest possible under any given circumstances, should always be used with telephotos; more so from an elephants' back. Due to greater magnification, telephoto-lenses lead to camera shake. If 1/60 is alright with a standard lens of 50 mm on a 35 mm camera, then with a 200 mm tele it should be around four times shorter, i.e., about 1/250. Sometimes we take a negative and if it is not sharp, we blame the focus. Very often it is not so. The camera may have been focussed correctly, but slow shutter speed may have caused an overall unsharpness.

What applies to photography from elephant-back, holds true for photography from cars also. In a car more and bulkier equipment can be carried and one has a wider choice as far as selection of the desired equipment is concerned. The engine of the car should invariably be switched off just before the shutter is pressed—till then it should be kept running as the whirr of the running engine has a strange fascination for animals and they remain where they are, trying to figure out what is going on. Many photographers like to rest their tele-lenses on a sand bag or pillow on the car window. I am not in agreement with this. If there are many persons in the car and they are fidgety, there will inevitably be a shake. With many persons in the car, I prefer to hand-hold the camera and lens. However, if there are just 2 persons, a sand-bag or pillow on the window is alright.

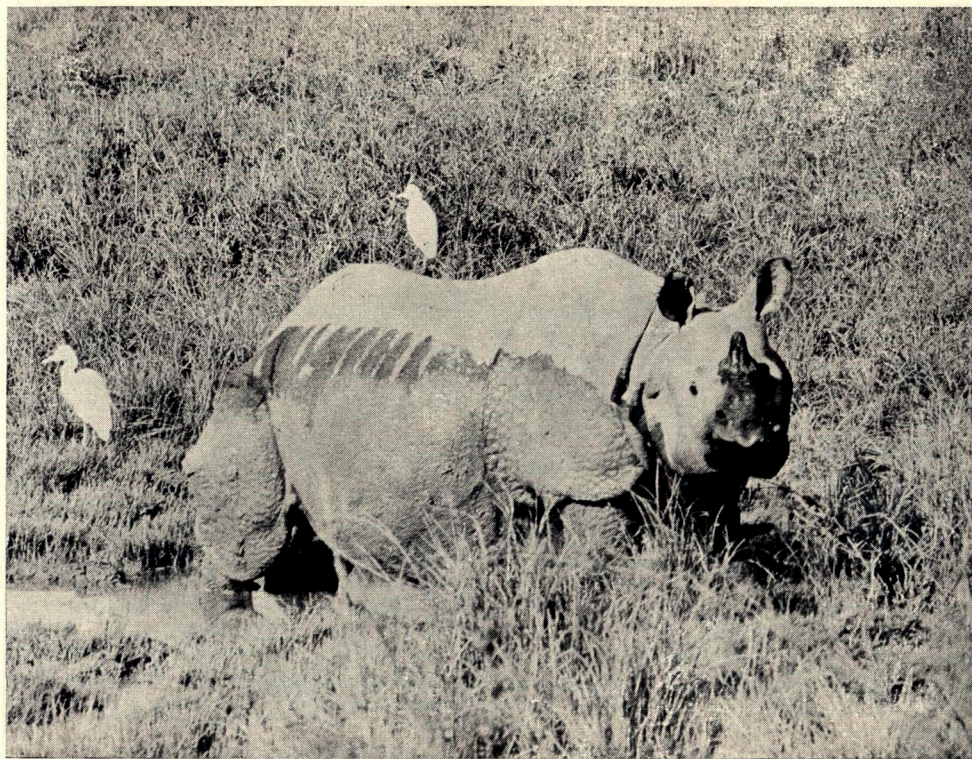
Photography of wild animals from a boat is only possible at one place—Periyar in Kerala. It is a beautiful experience. Sitting comfortably in a motor-launch, one can see and take pictures of elephants, 'gaur', sambar and wild boar, that may be found on the edge of the lake. A fast shutter is essential here as the waves and the motor both cause vibrations.

Still Hunting

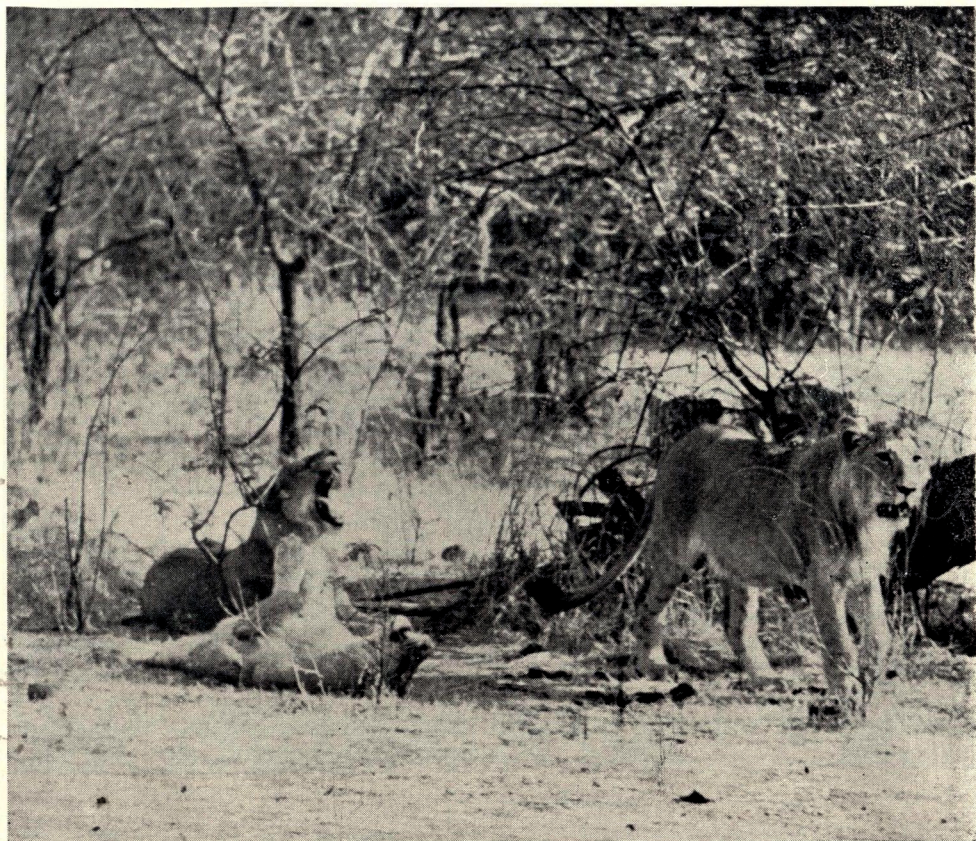
There is no difference between still-hunting with the rifle and still-hunting with the camera, except that with the former we 'shoot' to kill and with the latter we 'shoot' to preserve. In this case of wildlife photography, no attempt is made to go after the animals, instead they are allowed to come to the photographer himself. Examples of this in India are photography from hides or blinds at water holes, salt licks and particular grazing



Wild Elephants at Periyar



Great Indian One Horned Rhinoceros



Gir Lions



Indian Lionesses (*Panthera leo*) with cubs sucking

grounds. Photographing predators like tiger and panther, and other smaller wildlife returning to their natural kills, is also in a way still-hunting with the camera.

The hide can be on the ground, or a wooden platform on a tree. Most animals can be photographed at water-holes, particularly during the summer months. Deer and 'gaur' frequent salt-licks regularly and can be photographed there at comparatively close quarters.

When tigers and panthers make a kill, they do not finish off everything at once. If one is lucky to find such a kill, sitting in a hide or on a 'machaan' offers very good opportunities of photographing the predator when he returns to his kill. These animals return mostly at dusk or at night, and photography is possible only with a flash; bulb or electronic. Big bulbs are more powerful than most common electronic flashes. For colour, blue flash-bulbs should be used. However, electronic flashes of 100 or 125 joules are powerful enough for most work, and can be used both for black-and-white and colour films. Shortage of time is no problem and one can set up camera and flash, etc., at leisure. The camera and flash can be operated either from the 'machaan' or set up separately on a stand (which is well camouflaged) by remote control.

Photographing animals by trip-wire is also a method somewhat similar to the above. It is done by setting up camera and flash, with wire stretched across the path on game trails which animals take, and laid round in a circle where predators are to be photographed, when they return to their kills. It is possible to use more than one light-source by having two flash-bulbs or electronic flashes synchronised to fire at the same time. This gives the subject more even lighting and better modelling. The animals in this case photograph themselves by tripping the shutter when they touch the wire. Expectancy, excitement and thrill are absent in this mode of photography and may be this is the reason why it is not so popular.

Photographic Equipment

No two photographers agree entirely regarding the best equipment since personal preferences count for much in this matter. Two cameras are essential if one is taking both colour and black-and-white. It is preferable to have both ready, with separate telephoto-lenses mounted on each. Changing telephotos from one camera to another, even if they have bayonet mounts, takes time, and very often one misses some good shots during the time the lens is being changed, as neither camera is ready for use !

I find single lens reflex cameras, with eye level viewfinders, ideal for wild life photography. They are fast to handle and no matter what telephoto-lens is used, one sees in the viewfinder exactly what one is going to get on the film. Whether one uses a 35 mm SLR, or a $2\frac{1}{4}'' \times 2\frac{1}{4}''$ SLR, is a matter of choice. I use a $2\frac{1}{4}'' \times 2\frac{1}{4}''$ SLR with a 250 mm tele,

for black-and-white, and a 35 mm SLR for colour. In addition, I carry a third camera, a 35 SLR with a similar mount. I prefer the $2\frac{1}{4}$ format for black-and-white as it gives sharper enlargements if the full frame can be filled. More often than not this is not possible, except when photographing groups or herds, but even so one can use the surrounding areas judiciously to present a more pictorial composition where the habitat is shown well. A print that shows the species (if alone) covering about $1/3$ to $1/2$ of the print is to my mind a very good presentation.

For colour I use a 200 to 300 mm tele on a 35 mm camera, depending on the size of the animal to be photographed and the probable distance at which he can be photographed. This to my mind is ideal. 400 mm and bigger telephoto-lenses I do not use often. While it is true that they offer a bigger image, they have their disadvantages too, like bulk, weight, extremely shallow depth of field, objectionable foreshortening, etc. Compact zoom telephotos are very good, specially if they are fast and have an aperture of F 4 or so.

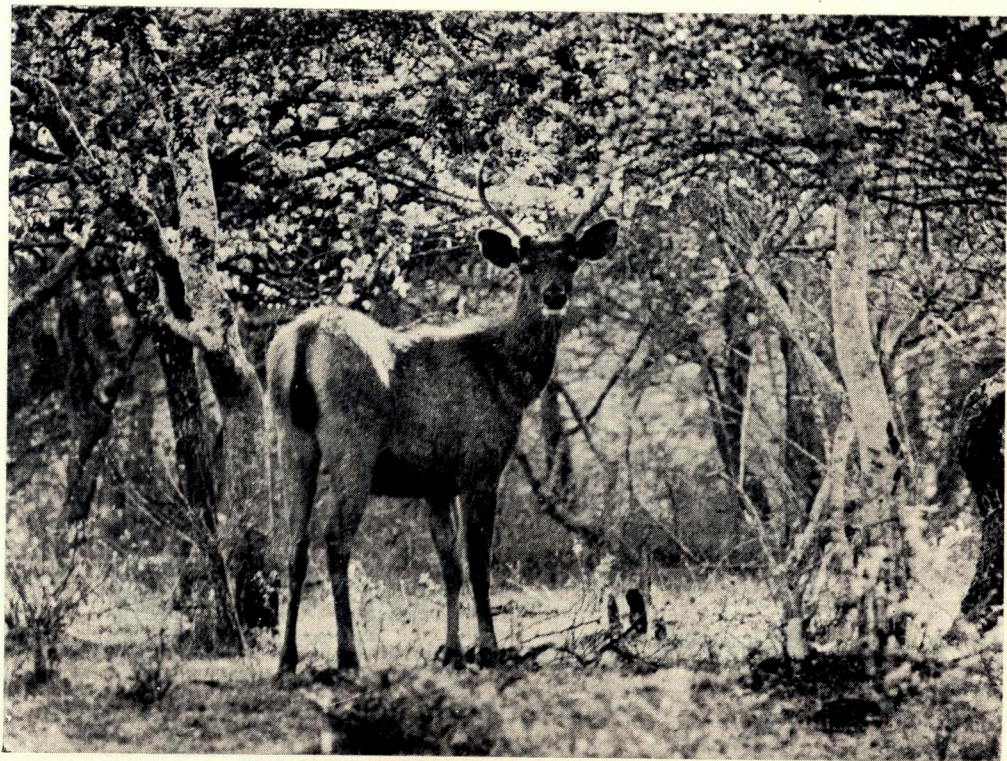
Except for the Gir Forests in summer, most of the forests where wildlife is found have dark green foliage. To lighten this I have often used a light-green filter to advantage. Besides lightening the heavy greens, it makes the dark-skinned animals, like elephant, 'gaur' and sambar stand out. Of course, this applies to black-and-white photography only.

My preference for films on the $2\frac{1}{4}$ reflex is Tri-X, H.P. 3 and the new H.P. 4. The second black-and-white camera, a 35, is usually loaded with Plus-X. Tri-X, besides being fast (which permits faster shutter-speeds and smaller apertures) is relatively less contrasty. This is an asset where the lighting is contrasty. For colour, I prefer to use Ektachrome-X, and Agfacolour, which have ASA ratings of 64 and 50 respectively. Occasionally I use High Speed Ektachrome, but not often.

I have found it a good practice to take a picture of any subject encountered, as soon as a reasonably good chance presents itself, and then try to improve on it.

Gadget bags and custom-built cases to carry equipment are all right for travelling, but when action starts I like to have all my equipment either on the cameras, ready-mounted, or in my pocket, of which I have as many as possible on my coat!

Experience tells me that the minimum of really necessary equipment is without doubt the best policy. Very often trying to figure out what would be ideal, changing and getting ready, takes so much time that when one does get ready to click the shutter, the subject is no longer there. Capacity to shoot fast sometimes makes all the differences between getting a picture and missing it. One should go on taking meter readings whenever the habitat and lighting conditions change, and keep lens-aperture and shutter-speed ready, so that, when an opportunity does present itself, one has only to focus and shoot. The lens, too, is best kept focussed at about seventy-five feet.



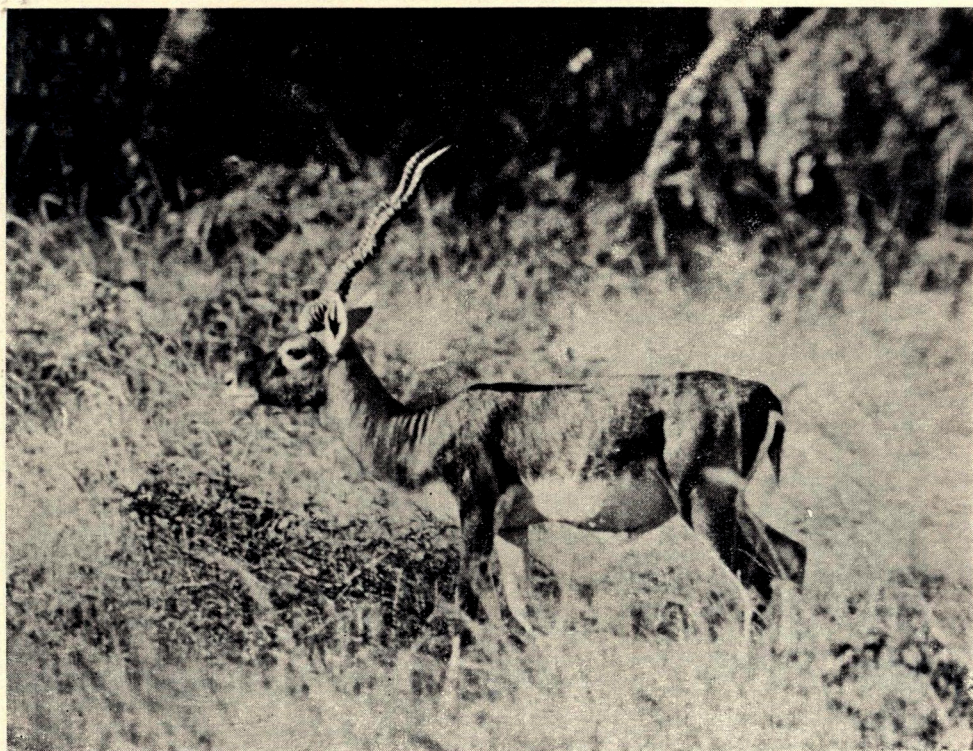
Sambar (*Cervus Unicolor*)



“Spotted Deer Stag” (*Axis Axis*)



Malabar Squirrel (*Ratufa Indica*)



Black Buck

The best seasons for wild life photography are late winter, spring and the summer months, as the grass is very high during the monsoon and early winter. However, India is a very big country and the seasons don't coincide exactly. At best it is only possible to make a rough general statement.

Photographing the rich and varied fauna of India is a fascinating, challenging and satisfying hobby. Naturalists and wildlife photographers come to this country, full Boeing-loads, all the way from America, only, and exclusively, to photograph our beautiful animals and birds. They visit our National Parks and Sanctuaries only, and are not interested in seeing other places. From this can be gauged the potential of the tourist traffic possible on account of our wildlife only.

For photography, a true "wildlife" subject—animal, bird or other, has been defined as one that is "alive, unrestrained and in a situation of its own choosing." Throughout this article, whenever the words "wildlife" or "wild animals" have been used, they have been used in this context. They have been used to differentiate them from pets, domestic animals and those in captivity.

In conclusion, I would like to say that a good wildlife picture that is satisfying in every way is not easy to come by, and that when we do succeed in getting one, it brings with it a sense of achievement; achievement with which are associated joy and happiness in the knowledge that our quarry still roams the forests, none the worse for its encounter with us, alive and unhurt.

A Mid-Winter Wildfowl Count at Kaziranga

By

M. J. S. MACKENZIE

Although mid-winter wildfowl counts had been carried out for The International Wildfowl Research Bureau in many places by numerous people over India during the past three or four seasons, no information was available from the Kaziranga Sanctuary in Assam. Apart from getting as complete a coverage as possible for the Assam area, it was most desirable to discover which species of wildfowl were visiting the sanctuary in the winter. Moreover it would enable the sanctuary to start keeping their own records of wildfowl and also promote tourist interest as an added attraction for the visitor to Kaziranga.

After correspondence with the Chief Conservator of Forests, Mr. P. Barua, it was decided in consultation with the Divisional Forest Officer (Wildlife Division) at Bokakhat that the count would be most conveniently carried out during the weak-end of January the 17th/18th, and could best be conducted by my voluntary team from Doom Dooma in co-operation with the Kaziranga staff. There followed the usual business of getting leave from the Tea Companies to enable us to be at Kaziranga for as long as possible, and as usual one of the team found that he was allowed only a strict two days instead of 'three' thus making no allowance for travelling the three hundred miles there and back: and again as usual, this was only learned at the last moment so that very rapid changes in plan had to be made!

After years of experience of the Assam Trunk Road and its many hazards during the day we decided unanimously to travel at night. Consequently the other two members of the team, Dick Scott and Peter Wilson arrived at my bungalow on Friday evening, and after a massive 'khana' sallied forth at ten o'clock in Dick's spanking new jeep. Now, although it may not be obvious to the reader, it is in fact very cold at night in Assam at this time of year and a jeep even when well 'battened down' is extremely draughty. Consequently, by the time we reached Sibsagar at about 1 a.m. with visibility just beyond the bonnet, the necessity for hot soup became paramount. Peter Wilson, who was in charge of travelling provisions was told to 'break out' the 'thermii' and issue hot soup rations; but alas science appeared to have let us down as nothing but a cold glutinous mess appeared from the thermos. Not to be dismayed, this was consumed accompanied by considerable comment on the capabilities of the caterer; The journey continued. Later at three o'clock a very unfortunate petrol station attendant was roused from his slumbers in Jorhat and we took on a further supply of petrol.

The arrival at the Kaziranga Tourist Lodge at 5.30 a.m. was remarkable as the place appeared to be totally deserted; however after putting out scouts, a chowkidar (night watch-

man) was located on the verandah of the Range Office, beneath a pile of sacks in the midst of a collection of rhino and buffalo skulls. This chap appeared to know nothing of our proposed visit and it was then decided that we should fortify ourselves with neat rum and chicken sandwiches. We awaited the dawn.

The next development was that a gentleman looking not unlike an escaped convict, in his dark high-necked serge uniform, appeared from the lodge and ambled unconcernedly past our jeep. However on his return, this worthy was ambushed and thus we discovered that he was a bearer at the tourist lodge, but he professed to know nothing of our scheduled arrival. Nevertheless to get out of the cold we moved to the lodge and to avoid disturbing any visitors we seated ourselves in the dining room having made arrangements for some hot water with which to make ourselves coffee. There now ensued a most interesting performance: that of the dining room being made ready for the guests' breakfast; tables being wiped down with a cloth that was also used to clean the floor, and when a dish of butter was dropped. This dish with only minor adjustments to the contents was then placed back on the table. The gentleman responsible for these operations was also suffering from a severe cold, and although he did not use the cloth as a handkerchief he made frequent use of his sleeve.

Some two hours later, having had 'breakfast', we thankfully made our first contact with the Forest Department, and learned that all arrangements had in fact been made for us to start our survey in the Baguri area of the sanctuary. Maps and count boards were collected from the jeep and we set out in the company of Mr. R.N. Sonwal, the Range Officer, to Baguri where two elephants were awaiting us.

The Baguri area is at the western end of the sanctuary and consists of large expanses of elephant grass and 'kuggeri', broken by numerous small bheels surrounded by rich grazing. The first impression on entering the sanctuary early in the morning was one of an endless sea of tall grass covered by a pall of damp mist from which one might imagine all sorts of things emerging; Little was seen at this stage except small birds and the odd Swamp Partridge raised by our elephants. However the moment the mist lifted a little and visibility improved we began to see Hog Deer dashing for cover, a number of Rhino grazing and several Wild Pig out feeding.

Owing to the type of country we were in, to get a reasonably accurate count of the wild-fowl present each member of the party was to travel on roughly parallel courses, approaching each of the waterholes as carefully as possible, counting the duck on the water by using binoculars and avoiding any disturbance.

It must be realised that, on a quick survey of this nature, one cannot expect one hundred per cent accuracy. The main aim being to get a fairly accurate picture of the numbers of duck present, to discover what species predominate, and in what ratios. In the past we, and

many others, have discovered that by using a number of experienced observers counting and checking one against the other, it has proved possible to get within 10 or 15% of the actual number present. Later, on this particular count this principal was admirably illustrated at the time of cross checking when it was found that we agreed on totals to within 2 or 3% where observations coincided.

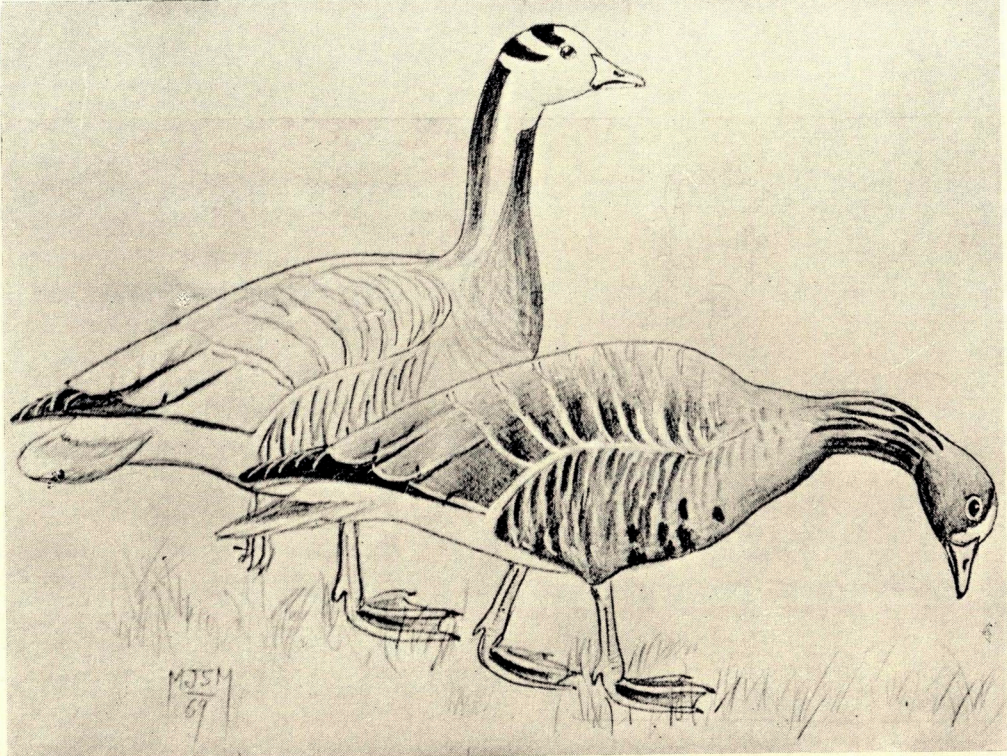
The first hour or so proved disappointing as far as wildfowl were concerned. Nevertheless all members of the party saw large numbers of Hog Deer, Swamp Deer, Pig, Buffalo and Rhino. Swamp Partridges frequently took off from beneath the elephants and numerous warblers and small shrikes were counted flitting about in the elephant grass. On nearing Bor-bheel, the largest stretch of water to be visited, the duck became more numerous, mostly consisting of Common Teal, White-eyed Pochard, Tufted duck and Indian Spotbill. However a flock of 92 Barheaded Geese was spotted grazing some fifty yards from the water of Digali bheel.

At about one o'clock we rendezvoused at the eastern end of Bor-bheel and traversed it in Indian file to the western end, at which was situated a small island surrounded by weed covered shallow water. On our arrival a large number of duck rose and flew back down the bheel settling on the deep water of the eastern end. As the elephants had to be rested we set off on foot and took up observation positions around the western end of the bheel.

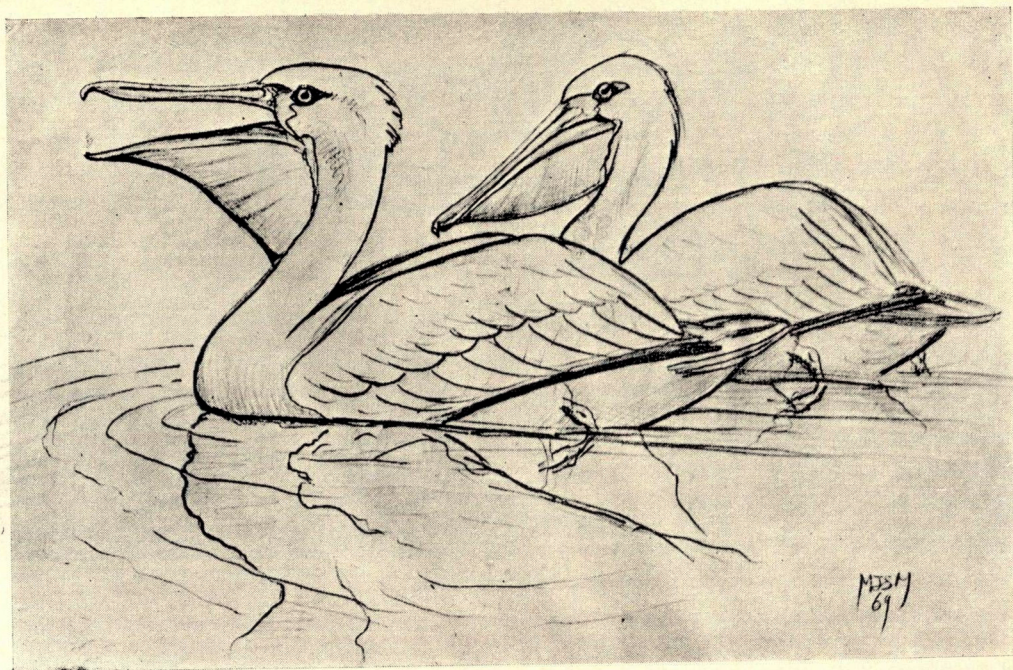
Shortly, the departed duck started to return to what was obviously a most attractive feeding area and within no time large numbers of Gadwall, Widgeon, Pintail, White-eyed Pochard and twenty-four Falcated Duck were happily feeding within forty yards of us. Under these conditions it was possible to point out and describe the field characteristics of the various species to the Range Officer, who in turn was able to compare them with the handbook. It was whilst doing this that a flight of 115 Barheaded Geese flew over and pitched right in front of us; to add to the excitement they were led in by a single Lesser Whitefronted Goose, this being only the fifth record of this species by us in Assam during ten years of observation.

It soon became time to leave and return, and again we separated to travel back by a different route as it was essential that we should be out of the sanctuary by dusk. This route took us past a large number of smaller bheels, many of them closely surrounded by 'kuggeri', and it was on this sector that we observed fair numbers of Mallard, Indian Spotbill and Common Teal. Also, as a matter of interest, we counted thirty-three Rino that afternoon; They seemed to be everywhere !

Having left the elephants at Baguri we drove back to the Tourist Lodge, arriving once again in the dark: Three hungry and very weary beings but extremely satisfied with the days work. The evening 'meal' having proven most unsatisfactory (not even the curry being



Lesser whitefront with the Barheads at Kaziranga.



Pelicans at Kaziranga



Tiger at Kaziranga

edible), Peter Wilson was again called upon to produce, whereupon delving into our packed rations he saved the day with large hunks of 'Desperate Dan' pork pie. As bathing proved most difficult due to somewhat indifferent plumbing and nothing but ice cold water, we proceeded to compare the various count boards for the days observations and then collapsed into our beds.

The following morning's work was again done from elephants but this time in the eastern sector of the sanctuary. This area is much larger than Baguri but contains far fewer bheels large enough to support duck in the winter. Although the general country was very similar, being mainly high grass, there were many more trees and a few small patches of jungle. It was in one such clump that we disturbed some Barking deer. We had expected to see fair numbers of Brahminy in this area but in fact only came across nine pairs, mainly in old water courses. As Kaziranga is normally reputed to hold considerable numbers of Brahminy it must be assumed that owing to the drought conditions they had left for the nearby Brahmaputra. The other wildfowl sighted were restricted to two small flocks of Gadwall, one flight of Pintail, a few Shoveler and fair numbers of Common Teal.

After a quick lunch (the remains of D.D. pie) we drove out to the Kohora Beat Office to cover as much of the central area of Kaziranga as possible in the time remaining to us. After a rather fruitless circuit to the north east we returned west to Katapara and Mihibheel (the latter of which contains a large nesting colony of Pelicans). However it was at Katapara, a small and very shallow bheel, that we found considerable numbers of Gadwall, Widgeon and Pintail. Great excitement was experienced in the midst of our counting when a tiger moved out of a patch of 'kuggeri' between our three groups and proceeded to stalk a small herd of Swamp Deer feeding on the waters edge. As the deer became alarmed they grouped together emitting a rather resonant grunting sound, and although the duck had taken no notice of the tiger they now got up 'en masse'. As the herd of Swamp Deer is valuable the Range Officer and Dick Scott who found themselves nearby, moved in to stop the tiger making his kill. This last adventure not being enough, on our return towards the Kohora office two Bengal Florican flew over the bund road and pitched in the grass quite near to us; These were the first Florican that I had ever seen and it was on this rather splendid note that our visit to the sanctuary ended.

Tired but replete with a fund of memorable experiences, the team was once again faced with an all-night road journey in the jeep; So having collected our kit from the Tourist Lodge and thanked the Range Officer and his staff, we headed north east along National Highway 37! To reduce the strain of driving it was decided to take turns at the wheel at fairly frequent intervals, the adventures of the last forty eight hours having left us all rather the worse for wear. This was later most forcibly illustrated when just before reaching Sibsagar, which was about halfway, we stopped for a cup of thermos coffee. A stationary jeep emitting derogatory comment at the gentleman in charge of liquid refreshment, (its

quality again being somewhat dubious) attracted the attention of the local Village Defence Party, who on investigation and discovery that we were in fact harmless, asked us to sign their book. I was the only member with a pen so handed it to Dick Scott who was at that time in the passenger seat, he duly signed the book and completed the details required, then handed the book and the pen back to the patrol leader. It was not until we had driven some fifty miles further on that 'the penny dropped', we realised what had happened, and what a bright bunch of 'clots' we were ! The arrival back in Doom Dooma at about 4 a.m. left us approximately three hours in which to get some sleep before having to attend morning office and a days 'kamjari' cycling round our respective tea estates.

Apart from the undoubted success of the count each member of the team enjoyed himself thoroughly and will always remember the weekend as one rich with interest and excitement. I can recommend to any wildlife enthusiast able to come to Assam, that a visit to Kaziranga is a 'must'.

WILDFOWL COUNT KAZIRANGA

		1st Day Baguri (West end)	2nd Day Kohora (Eastern end)	Totals
Mallard	...	49	18	67
Indian Spotbill	...	88	31	119
China Spotbill	...	-	-	-
Gadwall	...	301	188	489
Falcated Duck	...	24	1	25
Pintail	...	312	44	356
Wigeon	...	200	3	203
Common Teal	...	309+	374	683
Gargany Teal	...	4	-	4
Shoveler	...	18	13	31
Europe Pochard	...	12	-	12
White-Eyed Pochard	...	245	-	245
Redcrested Pochard	...	-	-	-
Tufted Duck	...	149	-	149
Brahmany	...	-	18	18
Greylag Goose	...	-	-	-
Barheaded Goose	...	307	-	307
Lesser Whitefront	...	1	-	1
Coots	...	-	-	-



Your milometer will prove— Dunlop C49 gives you 10% extra mileage

If you ride on Dunlop Gold Seal C49 car tyres you get 10% extra mileage. Because Dunlop has built special treads for the Gold Seal C49. Wide, strong treads that stand up to the pressures of normal driving—and yet remain firm and tough.

And the Gold Seal C49 has Safety Shoulders for that extra strong grip on sharp curves. What's more, the unique Dunlop Hi-Mu Safety Grip hugs road to tyre to see you safely home.



DUNLOP
GOLD SEAL C49
CAR TYRE
for 10% extra mileage,
Hi-Mu safety grip.



FREE BOOKLET

Send this coupon for your copy of
"How To Get More Miles From Your Tyres"
to P. O. Box 8045, CALCUTTA-16

Name _____

Address _____

JUST RELEASED

“MOON LANDER”

VACUUM FLASK

SEE : MAN'S HISTORIC LANDING ON THE MOON.

DRINK : FROM THE FANTASTIC REPLICA OF LUNAR
MODULE THEY TRAVELLED IN.

KEEP : THE EARTH BESIDES YOU AS THE ASTRO-
NAUTS SAW IT.

Stockists for 'EAGLE' Vacuum Flasks :

R. B. HAMER & CO.

Dispensing Chemists, Wine & General Merchants

DEHRA DUN

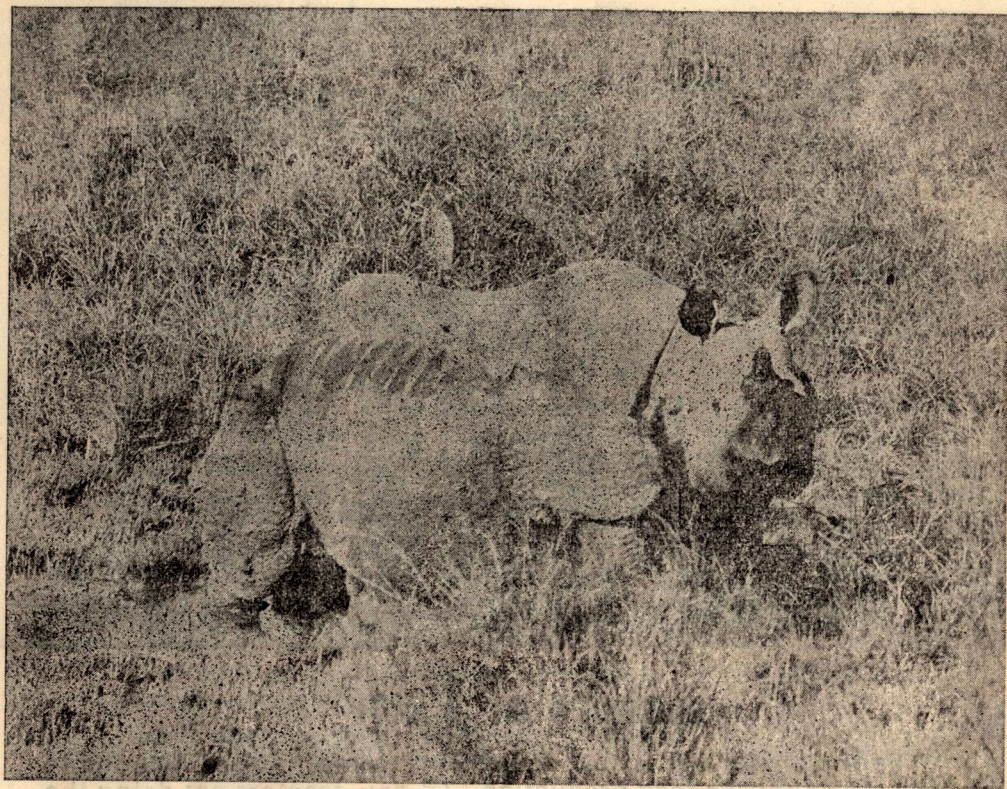
PHONE : 3522

MUSSOORIE

PHONE : 2

ASSAM INVITES YOU

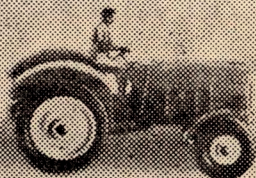
COME AND ENJOY THE SCENIC BEAUTIES OF ASSAM AND
VISIT THE FAMOUS KAZIRANGA WILD LIFE SANCTUARY
—THE GREAT ASIATIC ONE HORNED RHINO.



**Your Visits To World's Beauty Spots
Remain Incomplete If You Miss ASSAM**

(Issued by the Chief Conservator of Forests, Assam)

THE POWER BEHIND AGRICULTURE



ABMEL

makers of Exide

The Indian farmer is fast converting to mechanised farming to increase the country's food production. To-day, tractors are doing the work of ploughing, sowing and reaping at speed, covering many more acres in a single day. And it is ABMEL batteries that provide the power and give India's farming a tremendous boost.

Advanced techniques in manufacture, latest machinery and equipment, modern quality control and the combined technical know-how of an international organisation make ABMEL the leading manufacturers of storage batteries.

ABMEL

ASSOCIATED BATTERY MAKERS (EASTERN) LTD.

DISCOVER INDIA

FOR AN EXCITING GLIMPSE INTO INDIA'S PAST

son-et-Lumiere Spectacle of Sound and Light at the Red Fort, Delhi.

aily shows in Hindi and English.

urrent booking : Ring : 274580, Red Fort, Delhi. Tickets available half an hour before each show ☐ Tickets also available at Travel & Transport Counters at Jeevan Lodge, Hotels- Ashoka, Janpath, Lodhi and Ranjit.

LIGHTSEEING TOURS IN DELHI

aily in de-luxe coaches with expert guides, morning and afternoon.

FOR TRANSPORT - AIRCONDITIONED CARS, DELUXE COACHES AND FOR PRIVATE TOURS IN AND AROUND DELHI

dvance booking : India Tourism Development Corporation

Transport Division — Jeevan Lodge, L-Block, Connaught Circus, New Delhi.
Tel. 42336, 47653.

Travel & Transport Counters :

- | | |
|------------------------------|-------------|
| a) Ashoka Hotel, New Delhi. | Tel. 70311 |
| b) Janpath Hotel, New Delhi. | Tel. 46881 |
| c) Lodhi Hotel, New Delhi. | Tel. 619422 |
| d) Ranjit Hotel, New Delhi. | Tel. 275033 |

Also contact your travel agent.

ENJOY A QUIET HOLIDAY AT TRAVELLERS LODGES IN 27 PLACES OF TOURIST INTEREST

Book your accommodation at the Travellers Lodges.

For information contact : Tourist Offices all over India or

Your travel agent or The Managers of respective Travellers Lodges .

VISIT OUR DUTY-FREE SHOPS AT DELHI, CALCUTTA AND BOMBAY AIRPORTS

For transit and departure passengers : Duty-free imported liquor, cigarettes, perfumes, photographic films, pens, watches, a variety of Indian handicrafts, handloom fabrics, costume jewellery, tea, commemorative coins, gramophone records, etc.



India Tourism Development Corporation

Jeevan Vihar, Parliament Street, New Delhi 1.

Telephones : 45923-7 (5 lines).

Hearty Greetings

TO THE DELEGATES

To

*THE INTERNATIONAL CONFERENCE FOR CONSERVATION OF
NATURE AND NATURAL RESOURCES, NOVEMBER 1969*

FROM

Amitabh Textile Mills Limited

Premnagar, Dehra Dun

Phone : 3824

With the Compliments

OF

AUTOMOBILE PRODUCTS OF INDIA LIMITED

BHANDUP, BOMBAY-78

B S T

STEEL TUBES & PIPES

From the world's most modern plant

Bharat Steel Tubes, in collaboration with Abbey Etna Machine Company, Toledo, Ohio, U.S.A., are manufacturing tubes and tubular poles in accordance with the highest international standards.

BST pipes are manufactured in the size ranges of $\frac{1}{2}$ " to 6" Galvanized and Black.

BST is exporting Steel Tubes & Pipes all over the world.

BHARAT STEEL TUBES LIMITED

Regd. Office : Allahabad Bank Building,
17, Parliament Street, New Delhi-1.

Works : Ganaur (Haryana).

Branches : Bombay, Calcutta, Madras and Jaipur.

Sole Selling Agents : M/s. Raunaq & Company Pvt. Ltd.,
F/14-15, Connaught Place, New Delhi-1.

Greetings

TO THE DELEGATES I.U.C.N. X G.A. MEETING, NOVEMBER 1969

from

BOMBAY JEWELLERS

RAJPUR ROAD, DEHRA DUN, U.P. (INDIA)

KNOWN FOR INDIAN GEM & JEWELLERY FOR OVER 175 YEARS

Phone : 4143

Amazingly Better



than any
soap cake...
because of its
concentrated
washing power!

Super-Washing Detergent —with Extra-Rich Lather

Guaranteed to wash clothes WHITER & BRIGHTER!
Proved MORE ECONOMICAL than any soap cake!

Wildlife in Canada's National Parks

By

B. SESHADRI

The Canadian National Parks were a revelation. I knew that they, like the U.S. National Parks, had been developed as much for recreational purposes as for the preservation of scenic beauty and wildlife. The magnificent highways, the hotel, motel and camping accommodation within the Parks, the information centres, the descriptive signposts, and the presence of trained staff were well beyond anything I had been led to expect. But even more striking than all these was the peace in which men and the wild animals lived together.

My companion on this trip, from which I give a few highlights in this article, was Terry Bassett, of Lethbridge, Alberta, also a member of the Society. We drove close on two thousand miles during which we visited four National Parks in the Canadian Rockies—Banff, Jasper, Kootenay and Waterton Lakes—and the Glacier National Park in Montana, U.S. We were out looking for animals from dawn to long after dusk, and were amply rewarded. Terry knew the Parks well, and only his extraordinary generosity in all matters connected with the trip made it possible for me to see what I saw in that week—which was all the wildlife I could reasonably want to see in that short time.

Accustomed to national parks and wildlife sanctuaries in India and other countries where they are of small or moderate extent, I entered Banff (2,564 square miles) with the same thrilling expectation, looking ahead and to either side. But nothing stirred in the enormous pine and fir forests. It was not quiet, however. Cars sped by on the highway, although it was the fag-end of the holiday season. I began to worry that the noise would keep the animals well hidden. But Terry assured me that, on the other hand, the cars sometimes attracted the black bears to beg for food.

We were handed instructions at the Park gates that the animals were not to be fed on any account, and warned bears were dangerous. The time of the year—September—was not favourable to seeing large numbers of elk or mule deer as they would be still living in the higher slopes and only, perhaps, on the start of their downward winter trek to the valleys. But we hoped to see them as we climbed to Jasper.

I had heard much about the beauty of a Canadian autumn. But I was not prepared for the glory I saw all around me. The many varying shades of gold of the aspen leaves which were falling in showers, intermingled with the unvarying green of the pines, made a scene which was a never-ending delight. I battled to capture the colours and the effects on film, but did not need to wait to see the results to know the glory was too elusive for translocation.

It was late on the first evening when I made my first acquaintance with Canadian wildlife. It happened all at once. We saw a cow moose, a boulder-ringed lake, at its far and gloomy end, feeding on water plants. Every few minutes her head and shoulders would disappear under water, and after what seemed a long time up they would come again with a great bunch of leaves and weed caught in her mouth. She would then chew away till she had swallowed the lot. We stumbled and crept to that end of the lake and watched the ancient scene.

Moose are the giant of the deer family, and have a wide range extending across Canada and have also recovered in parts of the original range in western United States. They are very fond of water plants and we invariably saw them in lake, river or marsh feeding on juicy water lilies and a variety of weeds. This does not by any means comprise their entire diet, and they freely eat sedges, grasses and the leaves of woody plants and trees.

On a small island in the middle of a fast-flowing river were three elk hinds. The elk in America is the wapiti, while in Europe the moose is called elk. I crept to the water's edge, and watched them leave the island slowly and wade across to the far shore. I saw more exciting scenes later, but the first sights of wildlife have a peculiar exciting quality of their own. This is always so, perhaps it is a fulfilment of hope. One travels immense distances to a wilderness area to see wild animals in their natural surroundings, and when vouchsafed a first glimpse of them, all the trouble seems amply repaid. Across the river, partly hidden by trees, was the stag. The rutting season had begun, and the stag is never far from the hinds as there is much competition among the males to acquire as many hinds as possible. The hinds soon joined him.

The next incident provided some excitement. Through a break in the pine trees came three more hinds followed, some way behind, by a magnificent stag. It seemed a good photographic opportunity. Terry had warned me that stags were excitable and dangerous at this time of year and resented intrusion. Placing myself to one side of the gap I trained my cameras on the approaching stag, and waited in the fading light. He came on in mincing steps with eyes fixed steadily on me. When some ten yards away, he turned from his path through the centre of the break to face me. With a snort, he suddenly accelerated. I hastily backed to the shelter of the trees where he could not follow because of the great spread of his antlers. He stood glaring for a while before giving up to join his harem.

We soon saw another great stag, again with three hinds, but he was nervous and foiled my attempts to stalk him. He moved on to a small high clearing with his hinds, and as the light was really going now, I thought it prudent not to follow him.

Elk are grand looking animals, and once ranged over most of north-western United States and from Mexico to northern Canada all along the Rockies. They were rapidly

exterminated in many areas by the spreading colonists, till measures were taken for their protection. Now the range is mainly the Rockies, with a certain amount of restocking in a few of their former homes.

As we drove on, there were more elk on the sides of the road which I was told were regularly grassed to attract them. The tender shoots brought them out both early in the morning and late in the evening, and they seemed quite indifferent to the speeding traffic. There was also one mule deer.

The next morning started propitiously with the sight of a muskrat swimming vigorously in a small lake which clearly had been a favourite haunt of beavers. There were two abandoned beaver houses and a number of dams. Next, there was a cow moose way down in a valley, standing in ankle-deep water, looking untroubled and unhurried, of another age.

Black bear, which live in practically all of wooded North America, were said to be numerous in Banff and Jasper, and visitors used to be assured of seeing them around the camping grounds and the garbage pits. Indeed, their sociability in the Canadian and U.S. National Parks became well-known—and grew into something of a menace. The bears became regular cadgers for food, and if they were not promptly fed, or when a visitor fed them timidly or clumsily, they snatched at the food and in the process clawed people, with sometimes fatal results. Any kind of feeding of bears is now strictly forbidden in the Parks, and all garbage is promptly burnt by the Park staff. Bears who regularly haunted the campsites and could not be cured of this acquired habit were reluctantly shot, and consequently it is not as easy to come by them now as it used to be.

Terry however had had no doubt that we would see a few bear before we left Jasper. Sure enough, soon after we had entered Jasper Park (4,200 square miles), we saw a big male on some flat ground. He soon moved off into the trees. Behind us and close to the road came into view a mother and two cubs who were obviously intent on crossing the road. Unconcerned, the trio ambled past the wagon and leisurely crossed in our front, and might have stayed around had not two other cars, one with excited, screaming youngsters, arrived. The bears scurried away, and as the textbooks say a mother bear behaves when she suspects danger, she sent the cubs sprinting up the trees. I noted the pointed head and absence of shoulder hump which distinguish this bear from the grizzly, apart from size.

There were more elk on the way to Jasper, and we stood to watch a hind suckling her young.

The next day's quota included many mule deer, a golden-mantled ground squirrel, a pika, more black bears, a cow moose, and two beavers—very pleasing indeed. Mule deer have a wide range over southern and western Canada and western United States. A doe

between Miette Hot Springs and Pocahontas displayed, as she turned to go away, distinguishing characteristics of her kind of a large patch of white on the rump and the white tail with black tip. Three mule deer does near Pocahontas were restive in the rutting season. Stalking them without being seen or heard was impossible on the uneven ground without much bush cover and carpeted with dry leaves. I spent a great deal of time trying to get close to them, slowly and circuitously. This was partly successful, and they would let me to approach to about ten yards, watching me, before bounding away in graceful leaps. They would then stop and look at me before doing it all again as I got closer. Finally, they ran off.

Arriving at the foot of Mount Edith Cavell for the second time in search of pika, we saw visitors feeding a golden-mantled ground squirrel by hand. It was an attractive little thing, with a bushy tail and coloured grey on the body and cinnamon on the head and shoulders, and three black and two white stripes ran down the length of the back.

Walking up a great pile of rockslide, there was our pika. The pika belongs to the rabbit family, is brown and short and tailless, and looks like a small guinea pig. Other names by which it is known are rock rabbit and cony. It lives pretty much in the same place at all seasons, does not hibernate, and lives on small plants, which it cuts, cures and stocks for winter feed. It moved into and out of crevices in short, quick rushes, before it ran down into the rocks below and disappeared.

In the grounds of Jasper Park Lodge, a luxury hotel now shut for winter, we saw a group of three bears on a grassy slope feeding and rooting for berries. I walked up to within a few feet of them, but backed away when it seemed they might get too sociable. We met them again later, and followed them into the trees, but they lollopped away.

We had been told of a coyote which visited a camp ground near Miette to feed on tbits thrown to it by visitors. But the camp had been shut down, and although the coyote had been seen around, we thought the chance too slender for a prolonged stop. But the unexpected often happens when you are looking for wildlife. Returning from Miette in the far north of Jasper, there was a fine coyote in the open. Looking very much like a collie dog from a distance, it kept moving away as we tried to approach it, before finally running off. Despite wide human persecution, the coyote is said to be holding its own in most parts of its wide range in North America.

A cow moose in a marsh provided an interlude before we came to a large lake noted for its beavers. The lake showed every sign of current beaver occupation, and as we reconnoitred its shore, suddenly we saw one swimming not far from us. Our noisy approach over the very rough ground must have given us away, for it dived with a loud slap of its broad tail into the water, said to be the typical alarm signal of the beaver. This was repeated a few times in



Young male black bear in Kootenay National Park



Mule deer doe in full flight.

Photo—B. Seshadri



A typical beaver lodge, abandoned when this picture was taken



Bighorn herds on cliffside in Waterton Lakes National Park

Photo—B. Seshadri

the next few minutes, and after making some attempt to get ashore ahead of us, it swam away. We soon saw another beaver, which did much the same thing.

There was a fresh-looking beaver lodge which we investigated. A beaver house is a remarkable construction. It has the outside shape of a dome and is constructed primarily with sticks and mud and connected to the water so that the beaver may get in and out of the water without exposing itself. The beaver is an important part of Canadian history and has a place in the Canadian coat of arms. Its trapping was the country's big industry and the animals were being killed off in tens of thousands. Now given a measure of protection, they have partly recovered, both to live in security in the National Parks and wildlife refuges and to support the fur industry in other areas.

The great fascination in the quest for wild animals is that often nothing happens for quite long periods. You might drive or stalk for hours, looking expectantly now to this side and now to the other, holding your breath as you round a corner, till you decide it is your unlucky day. The expectancy gradually drains away and your senses become less alert. Then all at once the animals begin to crowd upon you, and the old feverish excitement is restored, and all seems well again. This happened to us many times on this trip.

A mule deer doe near Jasper Lake in her thick winter pelage of dark gray raised her head to attention, her great ears twisting forward. The name of the deer derives from this quality. The dark brown forehead which is distinctive of this deer was clearly visible. Occasionally, does grow antlers, but this one had none.

Early next morning, following up an elk stag and hind up a pine slope, I saw the stag stop and 'bugle'. This peculiar noise made by the stag in the rutting season is a challenge issued to other stags in the neighbourhood to come and battle for his females if they dared. Clashes between two sizeable stags are said to be tremendous encounters. I was to hear this bugling several times during this day from the interior of the thick pine forests which clothed the mountain slopes. We saw more hinds and half-grown croppers as we drove on, till the sun began to come up in the sky.

It was a magnificent field day. To the elk, moose, mule deer, black bear and bighorn were added. A browsing group of three mule deer made a pretty picture. Mule deer are essentially browsers, and feed on a great variety of leaves and twigs, grass and herbs. Their sense of smell is good, and the deer often 'whistle' when alarmed and before making off. In the young doe of the group, the spotted coat of young animals had already been replaced by a winter coat of gray, soon to be thick.

We saw eight moose in all, and it would have been a 'moose day' if it had not been for the numbers of other animals which projected themselves in view. I tried as cleverly as I could to stalk the day's first moose, a fine bull, but I got into a bog and the crackle and squelch soon discovered me for the moose. With a quick movement he ran out of the water and into the woods. There were moose on both Lower and Upper Waterfowl Lakes, but they always heard me sooner or later and trotted off into the dense pine background.

A golden-mantled ground squirrel and a chipmunk sitting side by side offered an opportunity to note the differences between the two. In addition to the dissimilarities in striping, the chipmunk was smaller by half.

A half-grown black bear in Kootenay National Park (543 square miles) and a big male soon after provided much excitement. The young one was resting in the warm sun and let me get to some six feet of him when he suddenly made a lunge forward with a loud 'woof'. The speed with which it was executed was a revelation, and my jump backward, performed only in the nick of time, was no less memorable. Photographing the big bear led to the execution of a series of manoeuvres at high speed, with considerable risk of falling within reach of his formidable claws. I had never before been nose-to-nose with a wild animal, yet when we finally bid him goodbye, the bear and I were this close—with a sheet glass window between our noses.

The next group of elk made a charming picture. Way down in a river valley were a great stag and seven hinds, standing ankle-deep in water. Presently, they started moving up the river in a trot and a splash, and we sat and watched, enchanted.

I had been warned that bighorn sheep and mountain goat were both elusive animals, not often seen without great patience and skilled stalking. Both live on inaccessible cliffs, and we had often scanned the gray and brown rocks high above us with field glasses in search of them, but there had been none. So it was clear our luck was holding still, when without warning, we came upon a bighorn herd on hill slopes near Radium Hot Springs. No big ram amongst them, but there were two near-adult males, many ewes and young. This was more than anything I had expected to see, and approaching them with caution I was able to take my fill of pictures. Bighorn are unsheep-like in that they do not carry wool like domestic sheep. Their hairy coats are more like those of deer. The horns of the female and young male are small and curve slightly, while those of the adult ram are heavy and curl back to almost a circle.

We had more incredible luck with this rarely seen sheep in Waterton Lakes Park (203 square miles) the following day. On the way to Red Rock Canyon, on a steeply sloping mountainside, was a herd of eighteen sheep. My patience and their curiosity enabled us to get fairly close together, with good pictures to show of the encounter. No big ram again, but rams generally wander on their own except in the rutting season, and they are also

reputed to be very wary. They do not often come out in the open—probably an acquired habit through persecution handed down to successive generations, before the creation of the Parks afforded them protection. Bighorn head is one of the most coveted trophies of the sport of hunting.

We marked down a rubbish dump to sit over that night for skunk. And sure enough when we got there well after nightfall, we caught a striped skunk scavenging in the headlights of Terry's wagon. We moved to within a few feet of the busy animal, but it took no notice, and we were able to watch as long as we liked.

In Glacier National Park in Montana, across the Canada-U.S. border, we began to look specially for mountain goat, which would complete the list of animals I had hoped to see on this trip. Glacier was said to contain quite a few goat. Terry had seen goat in one or two areas before, and so we made straight for them. At the second place, we saw a solitary animal up on an almost vertical rockface, and I marvelled at its obvious contentment in its bare home. We could not have got appreciably nearer without being in its full view the whole time, and scaling that verticality posed a formidable problem. Later in the afternoon, on our return journey from the western end of the Park, we saw it again, and it had moved down a couple of ledges.

Before recrossing the Logan Pass, we suddenly discovered to our delight a herd of eleven goats on a series of knife-edge ledges on a steep mountainside across a big valley. The goats moved about quite a bit, jumping from one ledge to another on that sheer rockface, and their surefootedness was a wonderful thing to watch. The forage on such cliffsides must be limited in quantity and variety, but is apparently quite adequate for the goat. This goat, by the way, is not a goat at all, but belongs to the antelope family. But it looks more like a goat than an antelope because of its bearded chin, long hair, and the slender horns curving backward.

We could not have crammed much more in this highly successful trip. We did not see any grizzly bear, which were still up in the higher ranges, and they do not also wander towards campsites and highways as do the black bears. Once we were in an area where whitetail deer lived, but they just did not show up, and we had to move on. But we were for the most part north of their general range. I saw bison both in Banff and Waterton Lakes Parks, but they were in large fenced-in areas and not in a truly wild state. There are no wild bison herds of note outside of the Wood Buffalo National Park in the north-eastern corner of Alberta in so far as Canada is concerned.

A few words on the organisation of these National Parks would be of interest. Their history makes fascinating reading, how from small beginnings the system has grown over the years. Many of the Parks were created from virgin lands owned by the Canadian

Government, and others, created later, came into being through the co-operation of provincial governments in turning over suitable areas for their establishment. From their inception, the Parks have served as refuges for wild life, as unspoilt preserves for trees and plants, and as recreational centres for the people. Where areas had been denuded of wild life, the species previously represented there were reintroduced. The conservation of species that might otherwise have become extinct has thus been assured.

The Parks have been so developed that they offer grand vacation opportunities for the people. The main highways are magnificent, and the network of access roads and paths into their interiors offer immense possibilities for exploration. Camp grounds, picnic areas, bathing, boating and fishing facilities, and nature trails have been developed. Many other outdoor recreational activities are also possible, such as riding, skiing and golf.

The staff organisation is designed to maintain these facilities at their maximum efficiency and to provide all possible information to visitors. All constructions, roads, signposts and others, are built in such a way that they take the best advantage of the scenic background and cause the least damage to the natural appearance of the landscape. Hiking and riding trails are maintained to allow access to regions of primitive beauty that can be reached no other way.

Much more can be written of these Parks. They were, as I said at the beginning, a revelation. Their object is to preserve the country's wild life and scenes of natural splendour for its people, and with the high standards demanded, there could have been no other result.

You don't have to be French to enjoy good wine !

Because
GOLCONDA
Wines are here !



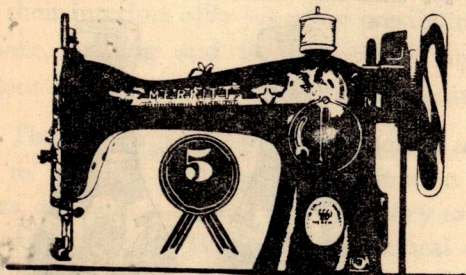
Dry White. Sweet White. Dry
Red. Good Wines. Table Wines.
Made in India. From Indian
grapes. At Hyderabad.

No! You don't have to be French
to enjoy good wine! Not any more!

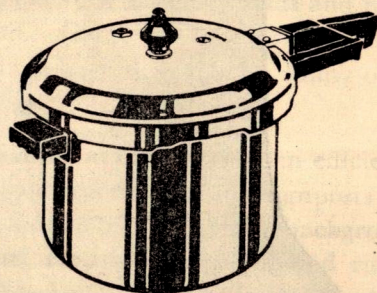
Dine with GOLCONDA Wine !

**SHAW
WALLACE**

THE NAME IS
SINGER
 FOR PRECISION MADE...

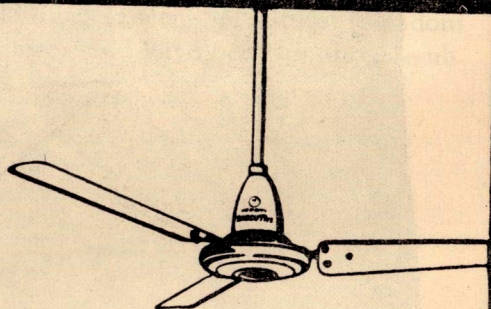
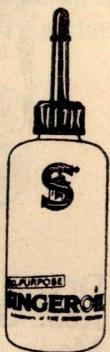


MERRITT Sewing Machines



SINGER* Pressure Cookers

All-purpose
SINGER OIL



SINGER / **MERRITT*** Fans



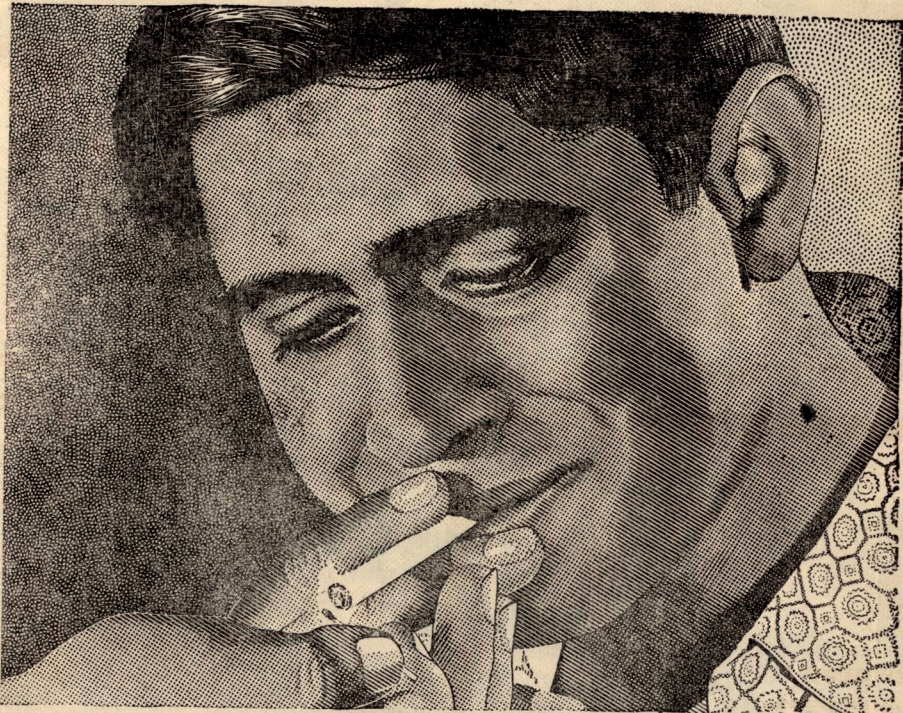
Good things come from **SINGER**



SINGER SEWING MACHINE COMPANY

* Registered Trademarks of The Singer Company
 Registered Users: Singer Sewing Machine Company

**WHAT'S SPECIAL ABOUT
OVER 3 CRORE CIGARETTES
ENJOYED BY SMOKERS
LIKE ME EVERY DAY?**



CHARMINAR TASTE OF COURSE!

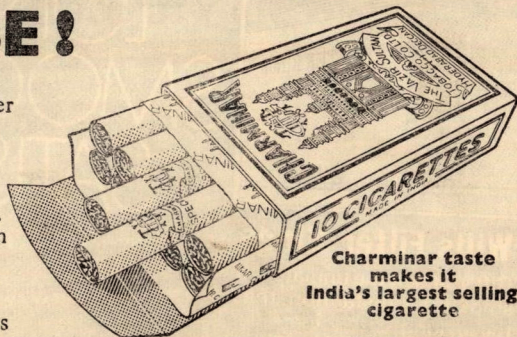
● That's right!

Lakhs of smokers enjoy over 3 crore Charminars every day — adding upto over 100 crore every month.

That's because Charminar offers something special : taste.

Charminar taste comes from the flavour of pure tobaccos, carefully grown and carefully blended by experts.

Right now, lakhs of smokers all over India are enjoying the Charminar taste!



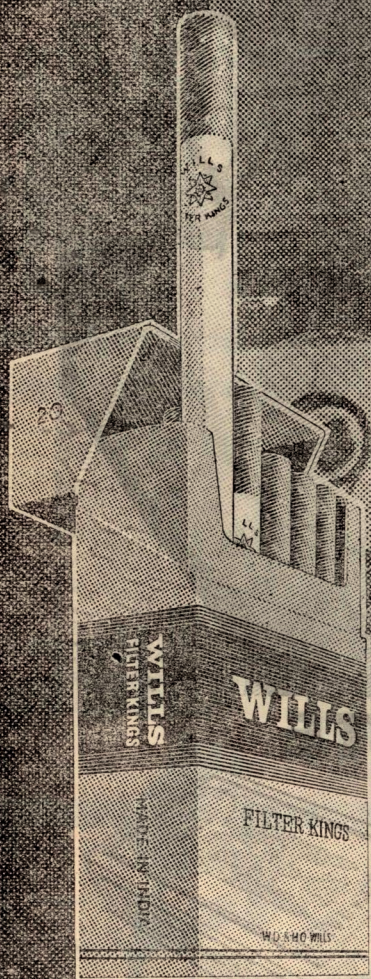
Charminar taste
makes it
India's largest selling
cigarette

30 P for 10

VSC/C-4

WHAT'S SPECIAL ABOUT

START A LONG AFFAIR



LONG ON SMOOTHNESS SATISFACTION VALUE

Wills Filter Kings

Gift yourself the unmatched smoking satisfaction that these king size cigarettes offer. Come to Wills Filter Kings. For taste as rich as the smoke is smooth. At Rs. 2 for 20, Re. 1 for 10.

The Hindustan Sugar Mills Ltd.

GOLAGOKARANNATH.

Manufacturers of :

Quality White Crystal Sugar

Absolute Alcohol

AND

'Gola' Confectionery

Regd. Office :

51, Mahatma Gandhi Road, Fort,

BOMBAY-I.

Telegrams : SHREE

::

Telephone : Gola : 1

Bombay : 255721

Music

OF THE SPHERES ...

—Even Gods are lost in Soul-stirring Music

India is the home of unique musical instruments

Sitar, Shehnai

Veena, Sarod

And a host of others which are deservedly the most cherished musical instruments both at home and abroad.

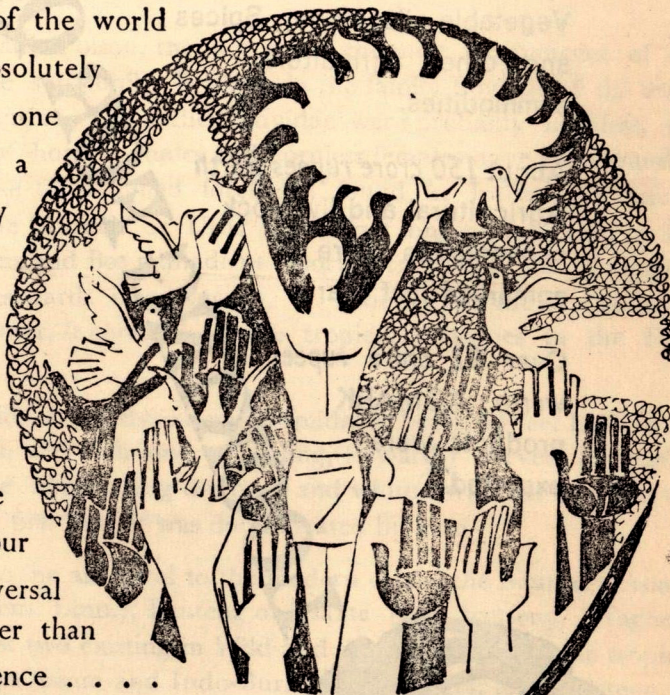
ALL INDIA HANDICRAFTS BOARD



World of future



The better mind of the world desires today not absolutely independent States warring one against another, but a federation of friendly interdependent States. The consummation of the event may be far off. I want to make no grand claim for our country. But I see nothing grand or impossible about our expressing our readiness for universal interdependence rather than independence



MAHATMA GANDHI



**MAHATMA
GANDHI**
BIRTH CENTENARY
OCT. 2, 1968 TO
FEB. 22, 1970
**महात्मा
गांधी**
जन्म शताब्दी
अक्टूबर 2, 1968
फरवरी 22, 1970

**Then Insist on
Agmark Products.**

Quality-conscious consumers
always insist on the AGMARK label
while purchasing Ghee, Butter,
Vegetable oils, Honey, Spices
and other agricultural
commodities.

About 150 crore rupees worth
Agricultural and livestock
commodities were
agmarked last year.

Over 82 crore rupees
worth AGMARK
products were
exported.

LOOKING FOR QUALITY?



AGMARK is the
official guarantee
given by the Govern-
ment after exhaustive
tests in well-equipped
laboratories.

**AGMARK—HALL-MARK OF
PURITY AND QUALITY**



The Southern Asiatic Gaur or Indian Bison

(*Bos gaurus gaurus*. H. Smith)

STUDY

By

M. KHADER HUSSAIN, B.Sc.

Assistant Conservator of Forests, Forest Resources Survey, Bangalore.

The Southern Asiatic gaur or Indian bison, the largest and the most magnificent of the living wild bovines belong to the sub-family Bovinae in the family Bovidae of the order Artiodactyla and sub-order Ruminantia. The earliest Bovidae were probably hornless, but lower Pliocene cattle composed of horned males and hornless females have been found in India and Italy. *Bos planifrons* (due to flattened forehead) found in Indian Pliocene is believed to be the ancestor of the 'Auroch' or 'Urus' the extinct long-horned, wild ox *Bos taurus primigenius* or *Bos primigenius* and *Bos namadicus* (short-horned ox). *Bos primigenius* spread during the Pleistocene Westwards into Europe, N. America via the Bering Strait, Western Asia, and N. Africa, and later, it spread into the tropical countries in the East. *Bos namadicus* stayed in the East.

The *Bos primigenius* was quite a handsome and formidable beast, 6½ feet high at the shoulder and some 10½ feet in length, and with long, spreading, forwardly curved horns. It was black in colour with a white stripe along the back and white curly hair between the horns and a white muzzle. For the first time it was domesticated by man.

Bos primigenius is believed to be ancestral to the modern cattle, the Southern Asiatic Gaur (*Bos gaurus*), Yak (*Bos grunniens*. Linn.), Banteng or Tsaine (*Bos banteng*. Wagner), and Gayal (*Bos frontalis*), the last two existing in Wild and domestic states in the tropical zones. (Gayal in the Mishmi Hills in Assam and Indo-Burmese hill ranges; and Banteng in Burma, Siam, Malaya, Java, Borneo and Sumatra). The Yak occurs over the high mountain plateaux of Tibet (14,000—20,000 feet) where the atmosphere is cold and dry. The wild Yak has black hair and the tamed ones are black or patched with black and white. The massive head has powerful outward curving, black horns. The Yak is allied to the American Bison (*Bison bison*) and like it has drooping head, humped back, long hair on the neck, shoulders and thighs and between its horns, and 14 ribs. The gaur have remained wild and untamable. They are not present in Ceylon, where, about 300 years ago they became extinct. No bovid entered South America or Australia.

There are now two living species of the Southern Asiatic Gaur: Gaur (*Bos gaurus gaurus*. H. Smith), Banteng or Tsaine (*Bos banteng banteng*. Wagner). The gaur have three geographical races which are closely related:—*Bos gaurus gaurus* (India, Assam, Burma,

Nepal, Bhutan and Malay peninsula), *Bos gaurus readei* (Burma and Tenasserim), and *Bos gaurus hubbacki* (Malaya). All have similar habits, living together in herds and feeding on grasses and bamboo shoots, according to season. (American Bison feed on grass only).

The gaur or Indian Bison (*Bos gaurus gaurus*) is a grand, streamlined ox. It is no sort of bison. It differs from the American Bison (*Bison bison bison*) and the European Bison (*Bison bonasus*) in being bigger and without heavy fore-quarters higher than haunches, a large hump on the withers and back and long, shaggy hair and while it lives in hill forests, instead of the open prairies like the American Bison.

The gaur's skin is black, jet-black in its prime and in old age slaty-black. (Body colouration is due to the pigmentation of the skin itself and is independent of the hair). Beneath the skin is an extremely thin layer of fat. White gaur 'of very light cream colour' occurs in Coimbatore district only. It is not an albino but lacks the pigmentation of the skin.

Body is massive and streamlined. Neck is short. Short, sleek hair of dark chestnut brown or almost black occur in varying density depending upon the age of the animal; the aged one being almost hairless. (The American bison has long, dark-brown hair on the head, shoulder and fore-legs and short hair on the rest of the body; and the hair is shed in spring). The legs just above the knees and hocks to the hoofs, are white. Pale white hair fringe the chin and on each side of the base of the whitish muzzle. Above the muzzle, is a thin strip of white hair tapering at the ends. On the forehead and upto the crest of the skull and nape and the base of the ears is a matt of ashy-grey hair. Axila and groin have golden brown hair. The tail with a black tassel ends at hock. (Banteng has bright brownish hair as youngster and as adult dark brown above and greyish below, with a white face, white stockings and white patches on the rump and a brown tasseled tail).

The skin glands all over the body produce a greasy secretion with a bovine scent. It is strong between the base of the horns and the neck near the ears. This scent is helpful to the gaur to trace out others when isolated, as they often rely more on scent than actual sight of the tracks. The gaur's skin is quite sensitive to irritation and the smell attracts flies and gad flies which bite the animal causing much distress. A dying gaur perspires profusely. After death some of the secretion of the skin glands glisten as resinous particles.

The average shoulder-height of a bull gaur is 5' 9" and the maximum recorded heights are 6' 10" (Rowland Ward's records in Burma), 6' 6" (Fletcher in Nilgiris), 6' 4½" (pollock). Cows have a height at shoulder between 5' 8" and 5' 10". Body length from nose to tail tip ranges from 12' 2" to 14' 0"; tail and tassel 2' 10" to 3' 3½"; girth behind shoulder 7' 10", weight 900 to 2,000 lbs; and recorded weights of bulls in South India, 1,900 lbs; 2,071 lbs; 1,297 lbs; 2,047 lbs. (R.C. Morris 1947); 2,438 lbs. and 1,966 lbs. (R.C. Morris 1938—N. Coimbatore).

The face profile is concavoconvex. The forehead is convex. The bull has a noble head, laterally situated large eyes, a broad, moist, whitish muzzle, laterally placed wide nostrils and neat, semi-circular horns. The nostrils are bordered by the nasal and the pre-maxillary bones (but in the American Bison the nostrils are bordered by the maxillary bones also). The female gaur also has a graceful head and is heavy set and streamlined like the bull and both the sexes have shapely hindquarters (The American Bison has a large head, heavy forequarters, higher than haunches and a large hump on the withers and back). The colour of the iris of the eyes (South Indian gaur) is brown and the Cornea is blue. If a torch light is held on the face of a gaur its eyes glow blue, due to reflection. The ears are 9 inches long, with a light fringe of hair on them. An aged gaur has no such hair in the ear and the ear is at times torn. The ears can be moved independently of each other and stretched out taut to catch any sounds there may be.

The skull bears an elevated ridge between the bases of the horns (less prominent in Banteng and hybrid Mithun; but Banteng's forehead is (2") thick as the frontal bone is thin). A curious dorsal ridge (rather than a hump) runs back from the withers to about half-way along the back where it ends abruptly with a drop of four or more inches in old bulls. The neck has no dewlap (but present in Banteng and hybrid Mithun).

Teeth:

Incisors and canines are absent in the upper jaw (Pre-maxillae) but a soft, horny pad is present. An adult gaur has six incisors and two canine teeth of equal size and in close contact in the lower jaw or mandible (acting as grass cropping apparatus). A long space (diastema) separates the canine from the first molar. The molar and Pre-molar teeth number six on each side of each jaw (maxillae) are selenodont, that is, bearing flattened crowns topped by two double folds of enamel of an irregular crescentic shape, meant for chewing the cud with many strokes of jaw. The mandible is a slender bone, slung somewhat loosely on to the skull, and the joint between mandible and skull (auricular condyle) is placed far above the level of the teeth so as to bring all the cheek teeth on one side into play at once. While chewing food the ruminant swings its lower jaw first a number of times to one side and then, reversing the direction, about an equal number of times to the other side, so that the grinding teeth on both sides of the mouth are used in turn. An adult gaur has 32 teeth.

Horns:

Both the sexes bear horns. The horn consists of a bony process or horn core with a covering skin; the inner, or dermal layer of this skin is richly supplied with blood vessels, while the outer layer, or epidermis, develops the horny fibre, chemically and morphologically akin to a mass of cemented or consolidated hairs, which constitutes the 'sheath' of the horn.

A zone of active growth at the base of the horn keeps adding to the growth. The outer

sheath is hollow and can be removed whole from its bony core. The core has hollow spaces (continuous with the frontal sinuses). The horn starts growing from the frontal bone of the skull in front (from the sides in the American bison) soon after the calf's birth, and continues to increase until old age. The horny sheath is never shed but remains throughout life and grows with the growth of the core. (In Cervidae solid bony antlers grow from the frontal bone with its integument or velvet and are shed periodically).

An adult bull's horns (anterior in position on the skull) are generally semi-circular and elliptical in section and have a wide spread, and however tend to grow outwards at the tips. The tips have a smooth or tapering point. The colour of horns is pale brown tinged green and with black tips to six inches or more. Both the horns are symmetrical with each other. They bear deep corrugations and gnarls at the base extending upto 10 inches or more along them and an average girth of 19 inches at the base. Some superficial layers of the horns flake off by constant rubbing against trees and mounds. Younger bulls do not have the massive girth, the deep corrugations, the wider spread or the colouration of the horns of the older bulls. The horns of young bulls and heifers have bright pale orange or golden brown colour from their base upto the black portion. The gaur has no bosses of hair at the base of horns like the Cape buffalo (*Syncerus caffer*). Cow's horns are rounder and more upright and smooth and with narrow sweep; and they are not worn out at the tips.

The spread of horns taken together with their girth is the test of a good head.

Horn measurement of South Indian bull gaur

Average spread of horns 32 inches girth of horn at base 18 inches.

Weight of horn 25-45 lb.

Recorded measurements

Horns tip to tip 34"; 39"; 39".

Outside spread of horns (extreme width). $43\frac{3}{4}$ "; $44\frac{3}{4}$ "; $46\frac{3}{4}$ ".

Length along outer curve of horn. $30\frac{3}{4}$ "; $31\frac{1}{2}$ "; 38".

Girth of horn at base. $17\frac{1}{2}$ "; 20"; $22\frac{1}{4}$ ".

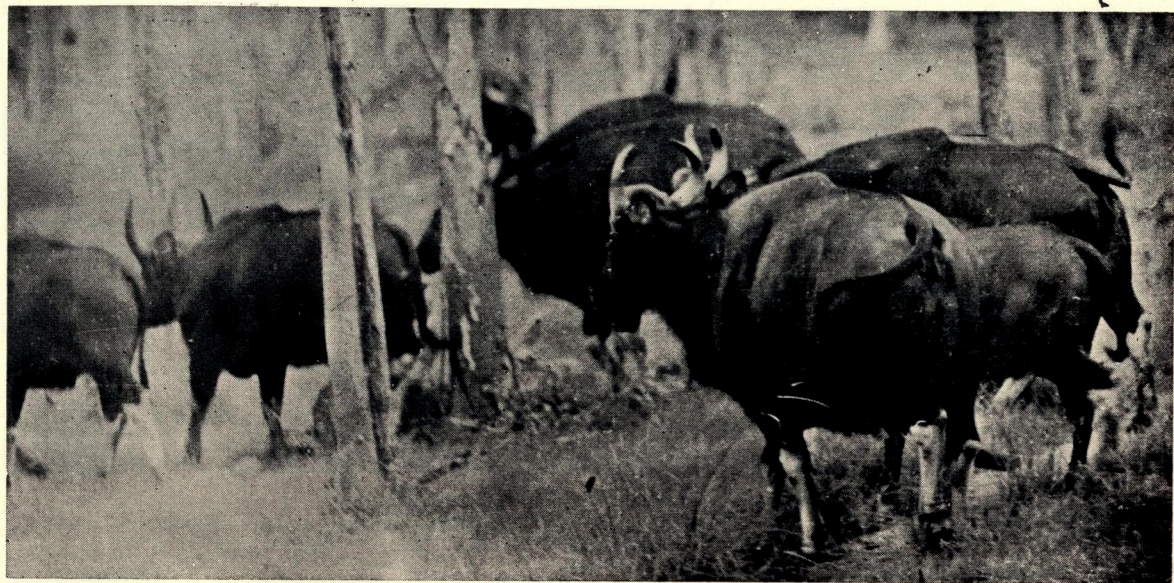
Bull gaur shot by H.H. the Maharaja of Mysore in Metikuppe forest (Mysore, in 1942).

Horns tip to tip. 42 inches.

Outside spread of horns. 52 inches.

Feet

In the forearm ulna is fused with the radius and reduced to an olecranon process to serve as an attachment for the Tricips. In the hind limb femur is long and fibula is reduced. The entire weight is borne by the radius, which acquires large surfaces of articulation with the humerus and with the carpus. The 3rd and 4th digits of the fore and hind



Indian Bisons (Gaur) on the river—Bandipur Game Sanctuary.



A cow Gaur (Indian Bison) at the Bandipur Sanctuary.

—K.N.S. Iyer.



Indian Bisons inside Bandipur Game Sanctuary following the leader into interior forest.
Photo— Miss. Fazlur Rahaman



A fine specimen of Indian Bison Bull Gaur—a solitary one inside
Bandipur Game Sanctuary.

—K.N.S. Iyer.

feet are equal in size and symmetrical with respect to axis of the limb passing between them (Paraxonia) and these are encased by dark-coloured hooves (hence the name 'cloven-hoofed animal'). The 1st or innermost toe is absent. The 2nd and 5th or outermost toes are reduced and form the 'petty toes'. The elongated metacarpals of the 3rd and 4th digits are fused together forming a single 'cannon bone'. The hooves of gaur are small and close-knit with heart-spoor. They are well suited for use on rough ground. They also aid movement in swamp by expanding when sunk into the swamp and closing on taking out. In aged bulls the hooves tend to splay due to heavy body weight and leave deep spoor. (Wild buffalo—*Bubalis bubalis* Linn. has widely splayed hooves). Progression is digitigrade. The usual gait is a plodding walk in a diagonal sequence: left fore-foot; right fore-foot; left hind foot; right hind foot (unlike the rotatory sequence in deer and antelope: left fore-foot; left hind foot; right hind foot; right fore-foot). The gaur can trot and run fast with a rolling motion and ascend the steepest slopes and jump across a stream 16 feet wide with remarkable surety and agility.

The vertebral column is of a single girder plan with 13 ribs (Yak and the American bison have 14 ribs). The heart and the roots of the great vessels lie almost free inside the tough pericardium. This is attached below to the central tendon of the diaphragm and above to the arterial trunks. In the heart the walls of the ventricle are thicker than those of the auricles. The lungs in their development grow out from the fore part of the alimentary canal into the anterior part of the pleural cavity and are suspended in the thorax and kept moist by the lymph-like pleural fluid. The diaphragm consists of a central tendon forming an arched double cupola, to the circumference of which are attached muscle fibres. The upper surface of the central tendon is united to the Pericardium.

The digestive tract includes the mouth and lips, teeth, oesophagus, stomach, small intestine and colon or large intestine. The tongue is covered with a mucus membrane and its anterior part bears filiform papillae which are of conical shape and horny and provide a very rough surface to the tongue. The papillae contain taste buds. The oesophagus opens at the junction of the paunch and the reticulum and there is a groove bounded by muscular folds leading from it to the omasum. The stomach has four chambers. The 1st large rumen (paunch) and 2nd reticulum (or honey comb) are situated in the left side of the abdominal cavity, 3rd fairly capacious omasum (Psalterium or many plies) and 4th abomasum (reed) having vascular glandular lining lie in the right side of the abdomen.

The gaur while feeding, curls its long pointed tongue round the grass and tears it with its lower teeth pressed against the tough pad in the upper jaw. It feeds rapidly, with very little selection. The food is taken into the mouth, ground to small pieces, mixed with saliva and swallowed. (Volume of daily secreted saliva is about 60 litres for moistening food). The partly chewed food first passes into the rumen or paunch. Only when the rumen is full the gaur stops grazing and sits down or stands in the familiar relaxed postures and 'chews the

‘at leisure’. In the rumen the food is rotated and further softened and regurgitated into the mouth in small boluses. Each bolus is chewed and pulped 30-60 seconds and re-swallowed. (The period of rumination lasts for 30-60 minutes and rumination occupies as many as 12 hours in a day). The pulped food enters the reticulum or ‘honey-comb’ where it is pressed (ejecting foreign matter, if any, causing damage to the other body organs) and shaped and sent up to the gullet and passed to the third chamber omasum which squeezes out water or moisture from the food and then into the fourth abomasum or true-stomach. Chemical digestion takes place in the abomasum which alone has gastric glands in its walls for secretion of digestive juices. Bacteria and some protozoa present in the alimentary canal also facilitate the ruminant digestion. Cellulose, the fibrous carbohydrate of the grasses and leaves is broken down by an enzyme called cellulase produced by bacteria in the rumen and reticulum and to some extent in the large intestine. The micro-organisms provide protein carbohydrate and vitamins of the B. Complex. In the ruminants the lower fatty acids, acetic, propionic and butyric, form a much larger fraction of the end products than they do in other mammals. As the bacteria die, they are in turn digested by the gaur and other bovines. When the food leaves the abomasum, it enters the small intestine, where the digested portion of food is absorbed into the blood stream; the remainder is passed into the large intestine and ejected as dung. The dung is heaped like round, flattened, thick cake by gaur. Scarab beetles convert the dung into balls and roll them along with their hind legs to their burrows for feeding the larva.

Genital organs

The two testes which produce both sperm and male sex hormone in the male gaur move downward in development away from their original site near kidneys, and lie outside the abdomen, suspended from the ventral surface of the animal in the compact scrotum, a pouch of the abdominal cavity. The testis is attached to the base of the scrotum by a cord, gubernaculum. The scrotum apparently helps control of the temperature of the testicles. The penis is an extension of the urethra and has a small bone ‘os penis’. In the case of the cow the two ovaries of symmetrical size are situated on the posterior wall of the abdominal cavity medial to and between the renal organs. The right ovary produces more mature ova than the left (unlike horse or pig). The two horns of the uterus (a hollow organ) are tube like, the cavities of which join in, or just above the cervix with a single cervical opening. The uterus is suspended across the pelvis in a fold of peritonium. At its lower end the vagina opens to the exterior of the vulva which consists of two folds of skin, labia majora and minora, enclosing a vestibule. On the inner side of each of the labia minora there is a mucus secreting gland (Bulbo-urethral gland or Bartholin’s gland), opening into the vestibule and these glands serve to lubricate the opening of the vagina. At the ventral side of the vestibule is the clitoris consisting of highly erectile tissue and a sensitive tip. The vagina connects the vulva and the cervix. Both the urinary and reproductive organs of the female terminate in

the vulva. The vulva swells during oestrus. The sperm reaches the ovum in 4 to 8 hours. Fertilization of ovum by entry of sperm into it occurs high up in the Fallopian tubes (uterine tubes). The embryo implants on the endometrium of the uterine wall but remains on its surface and continues its development during pregnancy. The placenta is cotyledonary and deciduate. Four mammary glands, situated in the inguinal region, are contained in a compact udder which is partitioned into galactophoric sinuses or milk-cisterns in which the milk collects before final liberation through the four teats.

Distribution and habitat

Gaur (*Bos gaurus gaurus*) are generally found at the foothills of the North-eastern Himalayas (6,000 ft. or 1,830 m) and the hill forests of Maharashtra, Mysore, Kerala, Tamilnad, Madhya Pradesh, and in parts of Burma and the Malaya peninsula, but not in Ceylon. In Mysore state the gaur are confined to more or less to the moist tropical evergreen and semi-evergreen forest zone of the Western Ghats and they extend to the tropical moist deciduous forest where the one passes into the other in Supa, Dandeli, Yellapur, Malmane (Siddapur) and Sirsi forests in North Kanara district; Someswara and Sitanadi forests in South Kanara district; Agumbe, Balehalli, Choradi, Arsalu, Harohithalu, Hanagere, Shanker, Sakrebyle, and Aldhara forests in Shimoga district; Lakkavalli, Sukalhatti, Dandbidara, Kowlapur, Hebbegiri Hills, Bababudan Hills, Jagar valley, Aramballi, Agrahara and Thunga-bhadra forests in Chickmagalur district; Kakankote, Metikuppe, Nagerhole, Dodharve, Thithimathi, Begur, Ainurmarigudi, Bandipur, Gopalaswami Hills, Biligirirangan Hills in Mysore district; Bellagi and Ponnachi Hills near Gunda stream in Kollegal Division; along the frontiers of Coorg, Wynad, Nilgiri Hills and Coimbatore district. The best environment for gaur is a series of isolated grassy glades, perennial streams and 'salt-licks' interspersed in the high forests. Teak plantations are used as shelter against the tropical sun.

Senses

The gaur is not so keen sighted. It can see upto a hundred yards. The sense of hearing and smell are highly developed. The ears are kept twining to catch every little sound. The keen nostrils glisten with moisture which aids to pick up many scents upon the forest breeze. The gaur can smell a person from a distance of about 400 yards in the windward direction.

Calls

The gaur emits two sounds, the familiar bellow of the bovines and a shrill snort of alarm caused by expelling air from the lips. When disturbed it lifts its head, takes a deep breath, stretches out its neck and repeats a long, drawling bellow—'phlioong' and also a loud 'bhay'. Angry bulls bellow. Devoted mothers low to their calves. A breeding bull while courting a cow emits a very peculiar piping and bubbling noise. At times, a wounded gaur in fury bellows gnashing its teeth. While feeding gaurs make snuffling noises like cattle. Sometimes

late in the evenings after a shower of rain and in drizzly, misty mornings the bulls roar aloud to each other and end in gruntings.

Herd instinct

Herd instinct is well developed and disciplined among the gaur. While in the open grassy glades the youngsters will be in the front or in the Centre and the old animals in the rear flanks. A sentinel or two and so too the master bull in the herd keep vigil during grazing. They test the breeze, pause to look and listen to signs of danger. The moment danger is sensed or seen the animals raise their heads, and stare, twitching ears and lashing tail and stampede in all directions and then turn around to gaze again inquisitively and some with a whisp of grass in their mouths. Then the master bull along with some young bulls steps forward, stamps and tosses his head up, shakes his horns holding ears taut and snorts in a threatening fashion which is a 'bluff' and in the meanwhile the cows and calves close in quietly and decamp and disappear in the jungle. As soon as the herd reaches safety, the master bull turns round and escapes through the bushes after the herd. He stops at some distance, turns about, takes a second look to assure himself that he is not being persued and finally he vanishes in the jungle. If danger is detected all on a sudden or confronted by surprise the bull flees into the forest with a shrill, startling snort. If the danger is suspected by mere scent alone, the herd silently moves off. During a forest fire the entire herd rushes forward. The calves run ahead of the adults and race along.

Family life

Gaur are gregarious. A herd consisting of 10 to 20 and upto 50 gaurs happens to be a family in which these animals are allied to one another and led by an imposing-looking, wise, elderly cow who proceeds slowly with her head more or less bent. A master bull (herd bull) accompanies the herd leasurely just behind.

In search of fresh forage or otherwise, many family parties congregate to form large assemblages each consisting of 200 to 350 animals, especially during the rainy days and then again they break into their respective small bands in old jungle clearings and Teak Plantations. Excepting the mating season, young and old bulls herd together with the cows and mothers with calves or older offsprings and elder cows in close amity. The mothers and their calves form the core of the herd. Calves collect together, run and jostle and butt one another. And nearby is the mother awaiting to suckle and shelter the baby calf. The young bulls often spar with one another and horn to horn. The master arrives late, lashing his tail and twitching his ears and moves forward majestically. Soon after he joins the herd the cows and young bulls stop feeding, gather around him and greet him by licking his body whilst he lifts his head up accepting their greetings.

Adult bull gaurs are solitary and associate with the herd periodically and rejoin the herd during the mating season. As they become old they prefer to be quite solitary from choice rather than necessity and some turn out to be aggressive and dangerous having been wounded or harrassed. Solitaries are often accompanied by a young bull. Cows are seldom solitary. They just leave the herd for about a week when about to calve or when taken ill.

Food

In the evergreen forests where grass is scarce on the floor, the gaur are confined to the grassy glades in hill sides and in the moist deciduous forests they keep to places having grassy undergrowth. The gaur feed on various succulent grasses such as *Imperata cylindrica*, *Saccarum munja*, *Pennisetum alopecuroides*, *Cynodon dactylon* and others. In Kakankote and Begur forests (Mysore) gaur feed on bamboo leaves (*Dendrocalamus strictus* and *Bamboosa arundinacea*) in 'Chike' patches, where bamboo is reduced to a low leafy bush, owing to the repeated damage of clumps by elephants; such stunted clumps are locally called 'Chike'. During the early rainy season they visit Bamboo facies both in the moist and dry deciduous forests to browse on the young soft shoots (sprouting bamboo culms). They also browse on the tender shoots of many tree and shrub species—*Xylia xylocarpa*, *Kydia calycina*, *Bombax malabaricum* (also its fallen flowers), *Hymenodictyon excelsum*, *Artocarpus hirsuta*, *Artocarpus integrofolia*, *Santalum album*, *Cedrella toona*, *Dysoxylum malabaricum*, *Pterocarpus marsupium*, *Bauhinia* species, *Musa superba* (Wild Banana), *Curcuma aromatica*, *Elettaria cardamomum* (Cardamom), fallen flowers of *Bassia longifolia* and *Bassia latifolia*, pods of *Acacia concinna*, bark of young *Adina cordifolia*, fruits of *Randia dumetorum*, *Careya arborea*, *Aegle marmelos*, *Phyllanthus emblica*, *Zizyphus jujuba*, and figs of *Ficus glomerata* and *Ficus bengalensis*. During the gregarious Bamboo flowering and seeding gaur are attracted to feed on the seeds. They nibble off occasionally the young shoots of *Tectona grandis* (Teak) in plantations when the forest is run over by fire in Summer. Gaur are very fond of pods of *Acacia concinna*. The pods are digested but the seed remain free and how they escape during rumination is a wonder.

Daily routine of feeding and resting

The gaur just before dawn (after getting up from sleep) come out of the forest to grassy glades (example, Yemkalkere and Yelemane in Agumbe forest and Dandbidara in Lakkavalli forest in Mysore State) for grazing. Their arrival is heralded by snortings, blowing and crashing the undergrowth and they follow a regular daily routine up to about 9 a.m. and even later when the mornings are cooler or when there is heavy mist or slight drizzle. In the day they stop and rest in the shelter of the forest and chew the cud. In the afternoon they come out again into the open at about 4 p.m. or even earlier if it is cool, go down to the stream to drink water and return to the grassy glade to graze till darkness sets in and some feed at night too.

While feeding they walk slowly, often making snuffling noises, but when alarmed they bolt away with a snort, their tail held straight out and heads low. They visit 'salt-lick' regularly when undisturbed. Very often during the heat of the day they eat mouthfuls of salt-saturated earth. If the 'lick' is a 'wet-lick' they can also drink. 'Salt-lick' contains phosphorus. The animals resort to the 'lick' to get this important element.

At night the gaur lie down and usually resting with their noses to windward side, in a circular fashion and keeping their calves in the centre, in the glade itself, where they graze, or adjoining it, but more often in the midst of the grass which they feed than under the dense forest cover. In Teak Plantations the gaur prefer to take rest on the nursery beds. The gaur lie down by first kneeling down with their fore-legs. When they get up, they rise first on their hind legs. They do not lie down straight like sheep and goats, but recline on one side. One little-known peculiarity is that they never seem to sleep; sometimes they do close their eyes but only in hot weather. They can remain standing still for long periods.

Solitary bull gaurs (both young and old) usually frequent, smaller, secluded clearings. A lone bull comes out late in the evening and without fuss and always on the alert. It feeds on the choicest fodder and quite cautiously on the edges, takes some rest and quits earlier than is usual with the herd, the following morning to the high forest to take shelter. (American bison sleep in the open air, in winter as well as in summer, subjected to every inclemency of the weather).

Where there are steep hills like the Bababudan Hills (Kemmanagundi 4,500 ft.); Hebbegiri (4,500 ft.); Biligirirangan Hills (5,000 ft.) and the Jager valley (2,500 ft.) in Mysore State the gaur will descend into the valley to feed at night, leaving early in the morning, ascend high up, and rest at a spot where there is a good look out against danger. The hill gaur are large, robust and carry the best heads. Their strong shoulder muscles aid them to climb hills and their hooves are hard and their undersurface is rough and irregular. Some gaur do not descend into the plains.

Seeking 'Pastures new'

Being a herbivore and mainly a grazer the gaur could be able to thrive over a wider territory, and spread into the poorer types of moist deciduous forests and in the dry deciduous zones where grasses and herbs are abundant. The Chief factors limiting their dissemination are the need of water and demand for shade and shelter for protection from sun's heat.

Each herd of gaur has enough means to support itself, to regulate its number and migrate seasonally in search of fodder and water, each year within their range. The gaur is typically a non-migratory species, each band being confined to a comparatively small area. But generally some local migration takes place in search of fodder seasonally — 'Pastures new'. In Mysore State between January and May the gaur seek the evergreen valleys watered by

perennial streams. With the start of the South-west monsoon rains in May, they roam about feeding on fresh, lush grass which sprouts on the hill tops and also tender bamboo shoots in the semi-evergreen forests and moist and dry deciduous forests. Occasionally they forage field crops in the adjoining villages. Thus their seasonal spread is governed by the availability of water. About September when the grass grows coarse the gaur move down to the forest tracts at the foot of the hills.

Gaur and their neighbours

Gaur and Sambar (*Cervus unicolor*) associate together and are often seen feeding together in places like the Bababudan Hills (Kemmanagundi 4,500 ft.) and Jager Valley (2,500 ft.). They also consort with elephants (*Elephas maximus indicus*) in Mysore district and Kollegal division and feed on bamboo leaves and branches of trees pulled down by elephants and left in their wake. Gaur and elephants when they come down to water to drink, often, fight. Two or three bull gaurs join together and butt the elephant with their heads by short thrusts. The elephant squeals and trumpets raising its trunk and the gaur puff and snort with their heads bent and horns directed towards the elephant. Sitting on a riding elephant gaur can be watched at close quarters in Bandipur Wild Life sanctuary (Mysore).

Cattle egrets (*Bubulcus ibis coromandus*) follow gaur while grazing, snapping up insects their hooves disturb and occasionally perching on their backs in the glades. Grey Jungle fowl (*Gallus sonneratii*) also accompany the herd of gaur to pick the beetles and such other insects that infest their dung and to peck off ticks from the belly and groin of the animals. The gaur take a warning of the presence of a tiger in the vicinity when the jungle fowl crow and cackle in alarm.

The gaur have a stark dislike for dogs, both wild and domestic. They charge on them at sight swinging their heads from side to side in a twisting motion.

The gaur do not mingle with domestic cattle and water-buffaloes in South India. Although gaur and gayal and their hybrid 'mithan' occupy the same hill forest the animals keep to their respective herd. As to their own inter-relationship, gaur do not establish rights over a particular territory or grazing ground except during the breeding season when each herd bull with a harem of cows keeps a breeding territory. Soon after the breeding season the master bull leaves the herd and the territory collapses and several herds begin to move about and meet together in one another's territory freely.

Gaurs are free from ticks, but ticks are found clinging in clusters on the groin and on the genitals. Leeches stick themselves between the cheek and nasal sinuses. Ticks leave the cold body of a dead gaur. Gaur are also much distressed by the bite of gad flies and mosquitoes and develop a tremendous itching. They wander swishing their tails, rubbing

their heads against bushes and thorny thickets. A bull gaur often demolishes a mound or an ant hill with its front legs and knees, pulverises the earth and then squirms and kicks until both sides of his body are well rubbed with fine dust. While moving about he quite often whets his horns against certain species of trees and stabs termite hills with the horns, and it is this that so wears and blunts their tips. The gaur do not stand heat, still they do not wallow in water or liquid mud like Samber, buffalo or pig. At the height of the gad fly season they come out into the open jungle.

Breeding

The breeding of gaur (Polygamous) is not well defined but breeding activity is intense during December and January. Only a solitary, superb bull re-joins the herd and becomes the master of the herd during the breeding or rutting seasons. He joins the herd usually late in the afternoon and returns soon after day light. He establishes grazing rights over a selected territory and the cows it contains. The breeding territory has a series of grassy glades, forest cover, perennial stream and a 'salt-licki. The master bull keeps out other younger and adult bulls which are in the herd and also intruders from other herds from his territory. He stays dominant as long as he can defeat the other bulls in combat. During his reign he mates with the cows and thus the best blood is infused from one generation to the other, and the race is maintained at its highest perfection and vitality and successful continuance of the progeny. (Inbreeding weakens and destroys the herd). If the master bull leaves his territory for water and forage or rest, he will return to find it occupied by a young rival bull and must fight to regain it. The rival comes out of the herd to challenge the master bull and starts to bellow and snort, paw the ground with his fore-feet and raise dust. The master bull too steps forward to meet the challenge, bellowing and pawing in his turn. He arches his back and gazes at him piercingly. Then he bends his head fiercely towards the rival bull. Suddenly the master bull raises his tail up and charges vehemently into battle with his opponent who is equally cautiously prepared. The cows in whose honour the battle is presumably fought remain unconcerned and nudge their calves a safe distance but a needy cow in oestrus may find some consolation in watching this battle. With a crash the two big foreheads meet—bone on bone. Now, in wild rage, they retreat, and pause and then lounge again snorting shrilly. The massive horns crash, clatter and hook viciously. Then again they back away and pause to graze for a while and resume their contest. Each bull tries to outflank the other, catch him off balance, and then smash into his side and gore him. The duel ceases as one of the rivals concedes his defeat and flees into the forest. He is pursued by his rival, who, however, gives up the chase. Thus every young bull tries to challenge the master bull and fight with him. The intermittent duels often continue for some weeks until the losers retreat into the forest leaving the herd. The master bull quite often avoids dangerous duels by simple ear-lowering, horn-wagging, or other stern display. Most individuals withdraw at once when they are threatened or

attacked. Sexual fighting is intraspecific and forms part of the reproductive behaviour-pattern among gaur (to win a seasonal territory and the harem of cows contained in it). In fighting for supremacy of their bands, older bulls are defeated by younger and more vigorous aspirants. Best sires are continually selected by law of combat for passing fresh blood into the progeny. Serious injury, or death seldom occurs in these fights. One afternoon I happened to watch a champion bull resisting five such challenges in about an hour and a half. One of those horn-locked pushing contests lasted for about twenty minutes and left the champion bull hardly able to stand. After some relaxation and conserving his strength the champion bull returned to the herd.

Breeding season affects both male and female animals. At this time only the reproductive organs are fully functional (when the environmental conditions are suitable). The reproductive organs of the male are in a state of continuous activity, but the cow has an oestrus cycle or period of oestrus when the ovulation (spontaneous liberation of the egg from the follicle into the oviduct) takes place and the cow is ready to accept the advances of a bull and mate with him. The pro-oestrus is indicated by the thickening of the walls of the vagina and the lining layers of the uterus and better supply of blood in these layers. At the height of the oestrus the vaginal lips swell slightly and special secretions with mucus are formed that attracts the bulls. In the tropics the cow's oestrus period recurs on average at 21 to 24 days intervals and often of a duration of 24 to 36 hours (the heifer may have a shorter duration than a cow). The ova cannot survive in a state of readiness for fertilization for more than this duration and it is not clear why it should be so.

A cow in full sweep of oestrus exhibits some excitement and restlessness. She leaves the herd and gives up grazing. She bellows loudly and squirts urine and thin mucus quite frequently. She displays sudden spontaneous out-bursts of jumping and running around a great deal. She mounts and is mounted by other cows and even runs in search of the master bull. Sometimes the other young bulls having sniffed her vulva pursue her incessantly and on noticing the herd bull they let her alone and they too retreat into the jungle. Some cows have silent heat periods and display absolutely no excitement. They may graze or stand or rest in their usual posture. In such a case, it is the bull alone that has to take an initiative to know the condition of heat in the cow.

The bull gaur on noticing the cow in heat behaves in a specific way when approaching her. He arrives at her place with his head gently raised. The oestrus cow stands aside or moves about gently or she may even be resting on the grass. But now the action takes a turn. The bull evidently convinced that by now her heart is aflame initiates the nuptial courtship by emitting a very peculiar piping and bubbling sound, and approaches her nose to tail. She stands still and responds in a manner revealing her sex and her degree of readiness to mate. The bull sniffs and stimulates her genitals by rubbing gently and rhythmically with his wet muzzle. She feels tickled and squirts urine. Having smelt the

urine and other genital secretions he curls up his lips in the characteristic bovine fashion and determines her reproductive status and finally gets stimulated sexually by her scent in oestrus (olfactory urianalysis). Consequently, conversely, the scent of the bull which she gets by sniffing at significant places in his body has also some effect on the cow. The bull then mounts the cow from behind extending his fore-legs and clasping her flanks on each side and after effecting penetration of the male organ into the vaginal passage the bull rises almost upright. The cow stands firm and still. The sexual act lasts half a minute or so in perfect silence and serenity. When the sexual act is over, the bull shuffles backwards and dismounts and walks away a few paces and remains silent. The cow then turns her face to the bull and displays her brief excitement by flapping ears and whisking her tail. After copulation, some minutes elapse before the sexual act can be performed again. Thus the bull copulates three or four times and upto six times in about an hour. The orgasm in the cow is indicated by copious flow of lubricating mucus secretion (from Bulbo-urethral glands or glands of Bartholin). Active movement of the uterus takes place to suck semen into the uterus and so hasten the transit of sperm to the Fallopian tubes where fertilization occurs.

The existence of a specific period in the cow (oestrus) for copulation is responsible for the brief duration of courtship and reproductive activity. Soon after mating a number of times the cow goes aside, rests and relaxes in a shady bush for some time. When her oestrus is subsided she avoids the bull's amatory advances; and if he insists to mount on her she promptly moves forward or gives a flip of her slim haunches and thus prevents copulation and he slides off. She leaves his company and re-joins the herd and stays with the herd during her pregnancy. The master bull then seeks some other seductive siren in the herd.

At the end of the rutting season the master bull is in a state of collapse having mated with a number of oestrus cows and his territory too collapses with him, and it is then that the younger bulls get a chance to mate with cows which come into heat late. The master bull quits the herd and goes on a holiday to another part of the forest and then resumes his solitary life or joins another young bull, till the return of the rutting season, when he again seeks his territory and the harem of cows and fights rivals to win it or be defeated by a sturdy bull in the herd.

The period of gestation is nine months. One calf is born at a time and very rarely twins are produced. The mammary gland of the cow reaches the peak of its development in pregnancy sometimes before the end, and it remains in this state until after parturition when it is awakened to full secretory activity.

When the cow is about to calve she comes out of the herd and seeks a secluded grassy spot, preferably near waterside. During parturition the cow lies down (on her right side) and heaves heavily in the grip of pain for a while. The calf is presented head and forefeet appearing first. It is wrapped in the caul. The umbelical chord connecting the calf to the

placenta snaps itself at birth. The stump still attached to the belly of the calf dries up and drops off a few days after birth.

The cow gets up swiftly after delivery and licks the membrane away from the calf's face, to give it a chance to breathe. Then she massages the calf's body, especially its hindquarters with her tongue, to dry the damp calf and to send the blood coursing through its young veins. The fleshy after-birth or placenta weighing about two pounds is dislodged and ejected by further renewed contractions of the uterus in about 20 minutes after delivery of the calf.

The new born calf weighs about 90 lbs., and lies huddled under the cow's belly for a few minutes after birth. It stands up balancing its legs the first few times. But hunger spurs it on, and soon it nuzzles backwards to the teat of its mother's udder where her milk is waiting it. The milk contains water 87.32%, fat 3.75%, sugar 4.75%, casein 3.00%, other protein nil, ash 0.75%. Besides the milk contains water soluble vitamins, carotenoid pigments, enzymes, mineral salts (e.g., Calcium phosphate and Sodium chloride).

The mother nestles the calf in the soft grass, and goes for grazing nearby, only returning at regular intervals for nursing the calf. She suckles the calf three or four times a day. The calf then rests in the grass with its neck stretched out. If any one comes near the baby calf it crouches flat on the ground, after the manner of a fawn. The calf can be caught hold of by gripping its hind legs when the mother is away—adults are caught in game pits.

The calf has close sleek hair, golden-yellow in colour which soon turns to reddish-brown, the colour of the young bulls and cows. The legs are long and stocky. The future white of the forehead and legs show an indistinct greyish tinge. Within two or three days the calf is capable of joining the herd, which is grazing nearby. It follows its mother in the herd which rambles slowly over its wide feeding ground. The cow fondles the calf with her tongue, licks and cleans its body. The mothers of other calves tolerate the approach of the baby calf to them and they do not show that antipathy to calves of other cows like the domestic bovines. In this regard they behave like the elephant. Father bull has little interest in the bringing up of the calf. The cow stands guard to her calf and rears it on her own. A calf is not so helpless when born. It can walk within ten minutes after birth and when disturbed it runs off with its mother.

In the baby calf the rumen is not developed and it is fed on milk. It is suckled upto ten months or an year and then it is gradually weaned. It accompanies the mother at heel for two years. The calf drinks 3 or 4 pints of milk in a single feed and thus daily it drinks 14 or 15 pints of milk. After weaning, the calf is a bit truculent. It fights mock battles and makes mock love and mounts on small heifers.

At birth the calf has its lower incisors (no upper ones). The juvenile dental formula is $I^0/3, C^0/1, Pm\ 3/3=10$ (temporary on each side). From birth to about $3\frac{1}{4}$ years the milk teeth remain and at the age of 4 years they are completely replaced by a permanent set of

32 teeth. The dental formula is $I^0/3$, $C^0/1$, $Pm\ 3/3$, $M\ 3/3 = 16$ (on each side). At the age of 10 years teeth crowns get reduced by wear.

At birth the calf's horns appear as knobs through the skin and begin to grow outwards at first and slightly upwards, straight out of the head, turn up in the second year and then in the third year commence to curve inwards in a semi-circular fashion. The two horns are in symmetry with each other. The horn elongates by dint of continual growth within a narrow zone or annulus, at its base. If the rate of growth be indential on all sides of this zone, the horn grows straight; if it be greater on one side than on the other the horn gets curved. Just at this stage the bull's horns are like the cow's, but soon they develop and the semblance ceases.

The calf's growth is fairly rapid in the first two years and weighs 700 to 800 lbs. Then at puberty, it puts on another spurt and later on its growth is gradual and attains its full stature in about four years.

A female gaur has an average of four or five calves in her life time (gaurs breed upto 10 years). The minimum breeding age is three years (both male and female) and in the prime between three to six years. The bull's interest in sex gradually declines after six years, and becomes staid after about eight years and after that he may lead a solitary life; while the cow keeps her mild interest upto ten years and later on she may become sterile.

Rate of maturity, in heifers, is dependent on voluntary feed intake and the quality of the feed. A heifer may even come into her first oestrus in two and half years. The mean age at first calving varies about $3\frac{1}{4}$ to $3\frac{3}{4}$ years.

The female gaur may breed and conceive again after 90 to 114 days after calving (service period between calving and conception) and the calving interval (period between two consecutive calvings) will be 12 to 13 months. These details need to be studied accurately in a number of cases and confirmed.

The normal span of life the gaur or Indian bison is 15 to 25 years. In old age a gaur is poor in condition with blunt edge of the fore-hoofs and torn ears and worn teeth. Very old ones may go blind, or deaf.

Diseases

The gaur in their natural state are quite healthy and robust and suffer no ailments except intestinal parasites which they get rid of by eating salt saturated earth in a 'salt-lick'. They are susceptible to foot-and-mouth disease, or aphthous fever, anthrax (splenic fever) and rinderpest, or cattle plague, a highly fatal contagious, filterable-virus disease involving severe gastro-intestinal trouble. These diseases are usually spread by domestic stock that are driven into the forest in large herds for grazing. In 1943 rinderpest had almost exterminated the

gaur in Mysore State. Their number however increased after some years. Again in the year 1968 this fell disease just set in, in Bandipur area (Mysore) and hundreds died.

Predators

The tiger is the predator which kills youngsters and adult gaurs. On scenting a tiger the herd of gaur form a defensive circle towards it snorting and pawing the ground. The cows keep their calves within the circle. In such an encounter the tiger may be injured, or gored to death.

A solitary gaur, when confronted with a tiger, stands firm keeping its hindquarters close to a tree trunk or bamboo clump, and stares at the tiger in front shaking its horns in a charging mood. The tiger is incapable of breaking the massive, muscular neck of the gaur. When the gaur is tired of charging, the tiger comes out into the open, and incites it to charge again. The moment the gaur swerves to charge the tiger attacks it by biting the tendons of its hind legs and brings it down. This manoeuvring lasts three or four hours at a stretch.

Relation to man

The gaur are shy of man and inoffensive. They keep away from human habitation. Of late, gaur have retreated far into the forests due to incessant human interference and advance of cultivation and the onset of hordes of scrawny, scrub cattle. The gaur is hunted by stalking it upwind in early morning or late afternoon; when it is overtaken. If wounded it hides in a dense cover, and it may charge and toss a hunter and inflict injury by stamping its sharp, heavy hooves. Occasionally a solitary bull may attack unprovoked, but its usual impulse is to flee into the forest on seeing man.

Hunting and poaching

Legal protection is afforded to wild animals under 'The Wild Animals Preservation Act' of the State. Licences are issued to hunt male gaur in certain shooting blocks in Mysore (Male gaur horns spanning 80 cms. and above or girth at the base 42 cms. or horns having four corrugations or more; Rifle to be used—Bore .375, bullet 300 grs. with a muzzle velocity of 2,500 feet per second and muzzle energy 4,000 ft. lb.). Poaching is controlled under the provisions of the Act. Still it is likely that some gaur of both sexes and of varied age groups are killed by poachers annually. Of late, there is increased tendency for poaching, due to shortage and high price of meat in the market. Beef of gaur is excellent and nutritious.

Origin of domestic breeds

It is said that 'zebu' (*Bos indicus*) the Indian humped, grey coloured oxen are derived from Banteng (*Bos banteng*) of Burma, Malaya and Indonesia isles, which are bigger than the Indian gaur (*Bos gaurus*) and the large, straight-backed, long-horned, white Chartley oxen (*Bos taurus*) with black ears and muzzle and also the smaller, white Chillingham cattle with reddish ears from the 'Auroch' or wild ox of Europe (*Bos primigenius*). Of late, it is believed

that both the Indian humped cattle and the straight-backed European cattle are descended from the 'Auroch'. But both the humped and humpless cattle have existed from remote times in India. But there is no indication as to how the wild humpless animal developed into the domestic humped one. The 'Zebu' bears traits of three varieties of *Bos* and probably developed in the Indus valley. The 'Zebu' is the progenitor of all the domestic cattle of Africa and Asia. It has a prominent hump above the shoulder, and a loose, pendulous skin under the throat, on the dewlap, navel, and the sheath of the males. The rump is drooping. The head is long and narrow, ears long and drooping, horns steep and upright, and legs thin. The colour varies from shades of grey to black. The Zebu's voice is just a momentary grunt. It occurs as a draught animal only in Asia and Africa—tropical countries with a dry climate. The Ankole oxen of Africa are noted for the length and massiveness of their magnificent sythe-like horns.

Banteng and gaur breed with domestic cattle. Gaur interbreed with the semi-wild Gayal (*Bos frontalis*) of the Mishmi Hills of Assam and Indo-Burmese hills (whose hybrids are called 'Mithan'). The Gayal is heavily built and stands 5 feet high at the shoulder and has a flatter forehead and greater dewlap. The body is dark brown, and the legs below the knees are white or yellowish. The short diverging horns are thick and massive and placed lower in the skull than those of the gaur. Gayals are kept by the Nagas solely for beef, not for milk and not as draught animals. They roam through the forest by day and return to the villages by night. The 'Mithan' are short-statured, sturdily built with a fine delicate head, well-developed dewlap and neat hooves. These are quite fertile and can be backcrossed.

Both the American bison (*Bison bison*) and the European bison (*Bison bonasus*) interbreed readily with each other and with domestic cattle (whose hybrids are called 'Catalo') and other bovines like buffalo. The hybrids are fertile and can be backcrossed.)

The gaur do not breed with buffaloes (*Bubalus bubalus*).

Preservation of Gaur and photography

Nowadays, the gaur need protection. In Mysore State the gaur are protected in the Wild Life Sanctuaries at Bandipur (Mysore), Nagerhole (Mysore), Jager Valley (Chickmagalur) and Dandeli (Belgaum) which contain extensive grassy glades, dense cover, perennial streams and 'salt-licks'. Domestic cattle and buffaloes are not let into the sanctuaries in large numbers as they not only forage and pollute water in the streams but spread contagious diseases such as rinderpest or foot-and-mouth disease. The gaur move about quite freely and thrive well in these sanctuaries. Many visitors are delighted to watch them and take their photographs when they are at ease in the open or at a well-patronised 'salt-lick'.

References

1. S.H. Pratar (1965)—'The Book of Indian Animals'. Revised edition. Bombay Natural History Society.
 2. Robert W. Hegner and Karl A. Styles. 'College Zoology' Indian edition 1967. Oxford and I.B.H. Publishing Co. Bombay.
 3. E.P. Gee (1964)—'The Wild Life of India'. Collins. London.
 4. R.I. Pocock. 'The Fauna of British India'. Vols. I and II.
 5. J.C. Jerdon. 'The Mammals of India'.
 6. A.A. Dunbar Brander (1923)—'Wild Animals in Central India' Edward Arnold & Co., London.
 7. Peter Gray (1961)—'The Encyclopedia of the Biological Sciences'. Rainhold Publishing Corporation, New York.
 8. J.F.D. Frazer (1959)—'The Sexual Cycles of Vertebrates'.
 9. G.P. Sanderson (1877)—'Thirteen years among the Wild Beasts of India'. John Grant. Edinburgh.
 10. H.S. Wood (1934)—'Shikar Memories'. H.F. & G. Witherby. London.
 11. R.C. Morris. 'Social Behaviour of Bison (*Bos gaurus*)'. Journal of Bombay Natural History Society. Vol. 38, No. 2/December 1935.
 12. M. Krishnan (1958)—'Our Animals'. Ministry of Food and Agriculture, Delhi.
 13. E.O. Shebbeare (1958)—'Soonder Mooni'. Victor Gollancz Ltd., London.
 14. Robert Ardrey (1967)—'Territorial Imperative'. New York. Atheneum.
 15. J.Z. Young (1957)—'The Life of Mammals'. The Clarendon Press.
 16. Clifford B. Knight (1965)—'Basic Concepts of Ecology'. The Macmillan Co., New York.
-

Story of the Lion Census

By

R.S. DHARMAKUMARSINHJI,

Vice-Chairman, and Secretary, Western Region, Indian Board for Wild Life.

I was sitting in the Office of the Conservator of Forests, Junagadh Circle, Gujarat, looking out of the window and admiring the Girnar Mountain towering in the background. Then, the Conservator, who had been talking to someone else, looked at me and said "I welcome you; I am trying to organize a lion census; will you please assist us?"

"Of course, I will", I said, and enquired how he was intending to go about it, the method he was thinking of using and other relevant questions. He was not certain. Then I asked him what he thought of the number of the Lion population and he returned my question.

I said "I have no doubt that the lion population is not as officially reported", and he seemed to agree with me. This was the basis on which I could join in helping him to carry out a proper lion-census. In my honorary duties of serving the cause of wildlife preservation in India and in the Western Region, the Gir Forest has always been of foremost importance to me, and to the Gir I make periodic visits. In 1963, I had been approached by the D.F.O. Junagadh, to join in the lion-census that year. Before accepting I had enquired how the census was to be taken and when. The method the forest department wanted to adopt was by spraying paint on each lion and counting each one sprayed until all the lions were painted. Or at least spraying as many as possible and counting them and adding those that had not been sprayed to those that were painted. The department had already ordered paint-guns for shooting colour.

I could not agree with this method for not only would it take too long to spray all the lions, but it seemed to me most difficult to do so. It may even take a whole year to see or contact all the lions and those that were sprayed may not be marked well-enough to be recognised again owing to the effects of sun, rain and dust. Furthermore, the report of the guns would tend to scare the lions and the animals would shy off or even charge, if the impact of the paint was concentrated. This census by paint guns was to commence with the Holi Festival, of throwing paint at each other as is customary.

Playing Holi with lions might result in a blood bath. I promptly turned down the offer. Later the forest department decided to use the earlier method of counting footprints, which had been adopted in the 1950 and 1955 censuses. Before being invited again, I was treated discourteously and therefore decided to keep out. This was rather fortunate as I later learnt that the entire burden of responsibility of the 1963 lion-census was to be borne

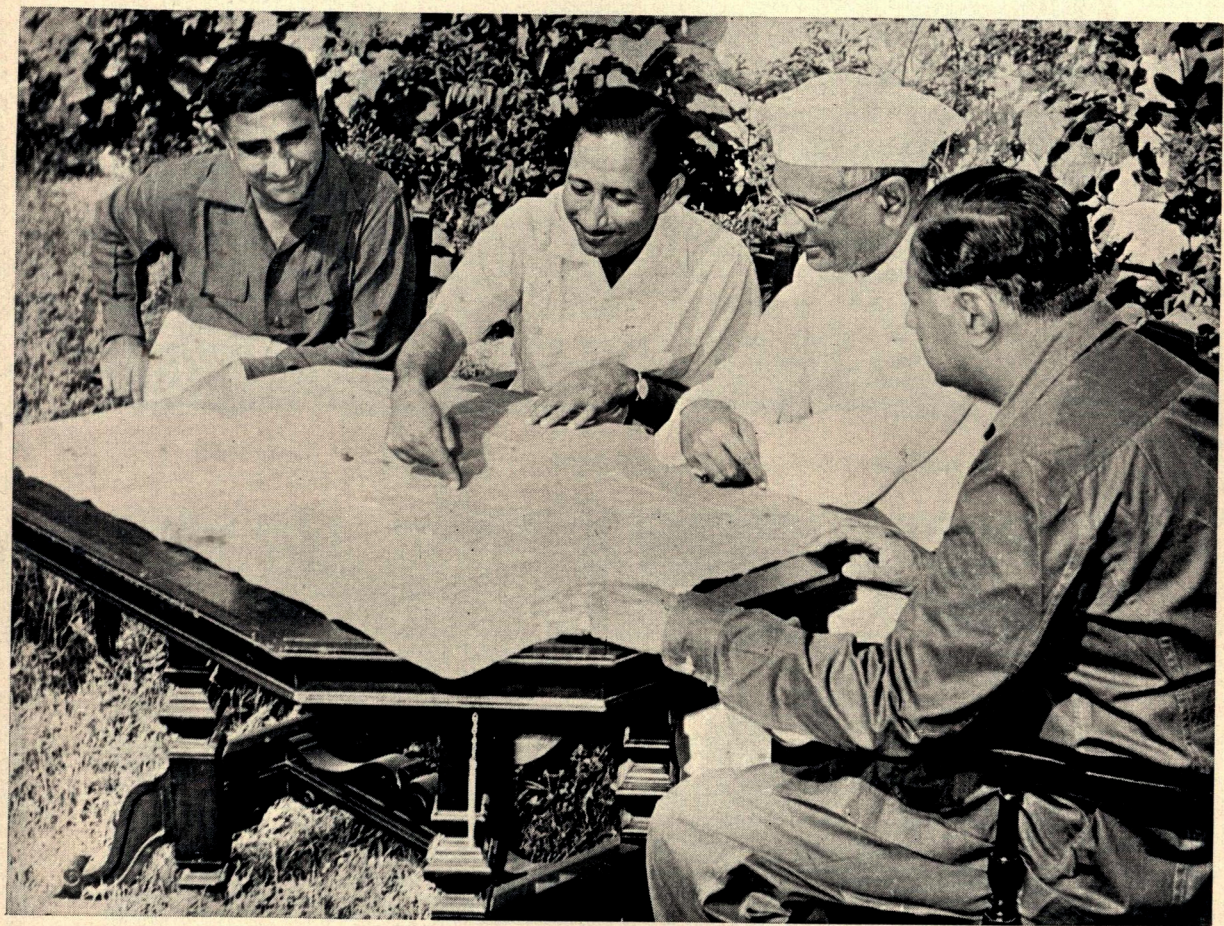


A Gir Lion after heavy meal in the Lion census by visual count, 1968.



A Large Gir Lion panting after a heavy meal of buffalo.
(Also see article "Transplantry of Indian Lion in Uttar Pradesh".)

LION CENSUS 1968



*L. to R. M.L.A., Conservator of Forests, Deputy Forest Minister
& R.S. Dharam Kumar Singh ji*

by one D.F.O., who was to organize a lion-census departmentally. The earlier censuses were organized by a capable naturalist, The Principal of the Rajkumar College, Rajkot, as suggested by the Raj-Pramukh of Saurashtra, and he could select his non-official assistants, of course with the full co-operation of the Forest Department. I had helped in these censuses.

The net result of the 1963 census was that there were reported 285 Lions and this figure was being repeated by Forest Officers annually like an old gramophone record. The earlier censuses had shown 219 to 227, and 290 to 314, lions respectively. With full protection given to the Lion, any alarming decrease in the Lion population would be too great a burden to bear for one D.F.O. This is quite natural.

Soon after the 1963 census, I visited the Gir Forest. Now, those who have had practice of picking up lion tracks from a running jeep, off dusty roads, can notice the frequency or infrequency of lions crossing or walking along such roads. I have had this experience. Moreover, I also questioned maldharies (who are most concerned with lions) regarding their encounters, and based my estimate on my own and their observations of the lion population. I have, in fact, noticed a marked trend of decrease in the lion population since 1956-57 and have brought this fact to the notice of the Indian Board for Wild Life.

With Government Departments there is a sense of prestige, which when queried, will in no way accept defeat. In this case, I was convinced that the Forest Department stood on false-prestige and in the 1963 lion census it wanted me, an expert, to be used as a stamp to support their argument, which of course could be contrived, according to their wishes, to accept a certain lion census figure emanating out of the census taken.

I was therefore particularly anxious that I would not be lured into a similar position in the lion census that was to be held in 1968. I therefore made my position clear with the Conservator of Forests. It is not that colour-censusing of wildlife is not done; it is a method used under specific circumstances with fairly accurate results. Before, finally accepting to join the 1968 census, I wrote to the C.F. as to the method that was to be used and the likely dates. Later I received a satisfactory letter and decided to join in this hazardous operation, trusting that the Conservator would not stand on prestige and sincerely brave the situation, should the census reveal a drastic change in the lion population.

Notwithstanding, the forest department has all the time since 1959-60 been placing the blame on the maldharies* for the destruction of lions and thus relieving themselves of most of the responsibility of affording protection to the lion. Now, therefore, the lion population must have been reduced, it was pointed out, largely due to the clandestine malpractices of the maldharies, for how else can a completely protected species decrease or reduce itself?

*Gir cattle herdsmen.

The number of cases of lion poisoning were negligible, and yet the situation was grave. Poaching of lions and natural deaths were comparatively few.

The stage was set. The 1968 Lion census was to be carried out in two phases. 1. Reconnaissance Survey. 2. A Direct Count of lions by the visual method deploying baits. I looked forward to the summons, to being called up, and received a delightful letter from the Conservator of Forests, Junagadh Circle, giving me the dates and plan of the lion-census. It was this: I was to be present throughout the period of census and also invited to attend a meeting of the D.F.Os. on 25-5-1968.

I arrived at Junagadh that morning and had a look round the Gir lions of the Zoo first, and then attended a meeting of D.F.O.s. with the Conservator of Forests as Chairman. The whole Census Plan was reviewed and questions and answers asked and given. This was followed by a sumptuous lunch given by the Conservator of Forests, in which the Collector and Police Officers joined. It was an informal *tete-a-tete* and proved most beneficial, as most of us had to nearly starve during our operational duties later on, not because of lack of food but owing to the exhausting work. We left for Sasan Gir, the headquarters of "operation lion-census 1968", soon after lunch, and reached Sasan within a couple of hours. I met Rangers at Sasan, who really gave me the scare that lions had become man-eaters and panthers were a menace to lion cubs! I was not put off by such stories, but rather enjoyed the evening conversations. The 26th May was a day when the D.F.Os. were to hold meetings in which the Rangers, Foresters, and Guards would be briefed regarding their duties and necessary instructions given to them. I readily joined in one of these meetings and listened to questions put to the forest staff. The staff also asked questions over points they did not fully understand. Diagrams of how to recognise a lion fore-foot and measure it, were shown and more instructions given as to the procedure of enumeration.

The 27th May was a day of readiness for the whole of the Forest Department and I had lengthy discussions with the Conservator regarding details of the lion-census. A lion-census requires much preparation and weeks of pre-planning, and I was now convinced that this had been done. I was, in fact, glad that the C.F. had courageously undertaken a Census Plan of direct-visual-count as the main objective of the census. The method had been picked out from my "A Field Guide to Big Game Census in India" produced in leaflet 2 by the Indian Board for Wild Life, 1958. Such a method had never been given a trial and here was an enterprising senior Forest Officer ready to do so. Unless theory is put into practice, it is difficult to assess its value, and I was keen that the method should be efficiently executed so as to see its advantages and disadvantages. Moreover, this method of visual or direct count would give more accurate results of the lion population.

The Asiatic Lion (*Panthera leo persica*) is one of the animals on the list of the IUCN's Red Data Book of endangered mammals of the world. The wide distribution of the Asiatic Lion,

which once spread from Asia Minor almost to Bengal in Eastern India, through the Middle East and Central and Northern India, had shrunk to a small portion of dry-deciduous-thorn forest in the western peninsula of Gujarat. Here, in the Gir hills, the lion had found its last refuge. Owing to its dreaded malaria, poisonous water and the rugged and thickly wooded terrain, inhabited by negro slaves and some nomadic cattle herdsman, the lion found safety. Now the position had changed and the forest was being exploited, and made more habitable, with cultivation penetrating to the heart of the forest. The maldhari, on the whole a peace-loving community whose livestock lived in harmony with the surrounding wildlife, was faced with the buffalo-eating lion.

The organisation of a census is not a small matter. Detailed maps of every portion of the Gir forest and its environs had to be prepared, marked with all the blocks indicating type of forest, and this was done by forest officers themselves. The entire forest staff of the Gir Division had been alerted, as if some major army operation was taking place. Every forester had been called upon and his duties assigned. The administrative layout of this organisation was as follows: The Conservator of Forests was the Chief Co-ordinator in overall charge of all operations. I acted as Co-Chief Coordinator, to see to scientific technicalities and any assistance the Chief-Co-ordinator required. The D.F.Os, including the Sanctuary Superintendent were Co-ordinators; The Range Forest Officers were Supervisors; The Foresters were Assistant Supervisors and Forest Guards and Game-Keepers were the Enumerators.

The whole of the lion-habitat, the Gir hills and outlying revenue areas, covering approximately an area of 705 square miles, is a huge area for censusing, specially when it involves steep and rugged terrain, cut up by innumerable ravines in fairly thick-set bush. The entire area had to be divided into zones and sub-zones, which again were divided into forest Blocks.

The most important preliminary work was to brief the enumerators and to see that the forms which had to be filled were properly understood. For this the Co-ordinators held meetings in their respective zones and the Supervisors in their's. At these meetings many doubts were cleared. Just prior to the first phase of the Reconnaissance Survey, I had a talk with the Chief Co-ordinator to explain that the counting of footprints on the 28th May and 29th May was a recognised method of censusing which, if done properly, should give a fairly accurate figure of the lion population and should not be taken lightly. It was the method adopted in earlier lion-censuses and though the 1963 census was suspect in my mind, the present First Phase ought to give a fair picture of the lion distribution and population. The present plan for this method was elaborated by closer scrutiny. Although sexes of lions are difficult to discern from measurements taken, we had come to a certain formula by which we could more or less discriminate between an adult lion and an adult lioness. Many of the experienced forest guards are clearly able to differentiate between the footprint of a male panther and a

young lion. Of course, errors will be made by the less experienced, and the scrutinizers would have to take decisions considering other factors. In the first phase, the erasing of footprints, measuring the fore-footprint length and breadth, and breaking a stick to conform to that measurement and tying it up and placing it in a bag and marking the site, direction of the animal moving, or any individual identification mark seen on the pug, were to be noted and endorsed in a printed form, while adding the name of the Zone, Sub-zone, Block and Unit, and also that of the Co-ordinator, Supervisor, etc., who collected and checked all these factors. Although the enumerators had an active part to accomplish, the arduous and monotonous work was of assorting, after the collection, of all records and then elimination of doubtful records, and finally mapping the records, and remapping, to present an entire picture, showing sexes and cubs.

The Chief Co-ordinator and myself carefully perused the final map and discussed the measurements taken of lions' footprints. During the two days of enumerating lion footprints, I did as much of checking of footprints as I could and covered a wide field of the Gir Forest, wherein I came upon various game animals and birds and got some idea of their density.

After this laborious phase of enumeration was over, we had only a short respite between the hard work of collating material gathered, and presenting it in proper order. At this time, I was alarmed by strong propaganda that seemed to spread like wild-fire in the Forest Department. Evidently, the Forest Department were fully aware that the lion-population had been much reduced and somehow it had to free itself from blame. Therefore, the Leopard was selected to be the scapegoat. It was the Leopard who was devouring lion cubs and for that reason should be destroyed. I resented this argument vehemently, and though an occasional lion-cub might be killed and eaten by a leopard, the chances of wholesale slaughter by leopards of lion-cubs seemed to me most unlikely. Even a Hyaena could pick up a stray lion-cub, but even that would be a rare occurrence. In fact I had never heard of such behaviour before in the Gir Forest in the past, even by experienced '*Pugees*' (*head shikaries*).

I may digress and say that the leopard plays a concomitant part in the ecological chain of Gir animal-life. When lion-cubs are small, the lioness is not far afield from them, and most often there is another lioness acting as what may be called "Aunt", which keeps guard over the cubs. I have seen a Male lion, lioness with small cubs, all in a family unit, and where the social lion family roams, the leopard generally keeps out of the way, specially when a lioness has cubs. (Any sensible animal would).

Another rumour that was spreading was that lion-cubs were being killed by trampling by buffaloes, and hence resulted the reduction in lion-population. Even such incidents may take place, but are not usual. All this, I concluded, was because the Forest Department had already made an assessment of the lion population before the main censuses, and had arrived at a low figure of 160 lions, which nearly coincided with the results of the main census under-

taken. The forest staff, therefore, were well prepared to explain themselves off somehow, of their own responsibility. I then realized again how seized they were of this problem.

The first phase of the census plan was completed successfully, and when it was over, it was followed by an attack on the Chief Coordinator, by various pressmen who wanted to know the result.

I am afraid at this stage the C.F. became a little unpopular, because he did not wish to reveal the findings as being the final result. The more important census has yet to be taken. Therefore, tactfully reticent replies had to be made by him and more information about the other fauna of the Gir forest was given.

The Deputy Minister of Forests had arrived, with crowds following him, who took advantage of seeing lions with him. No doubt he gave a fillip to us all in our work. He wanted the census taken by throwing paint, and I think this was a 'leg-pull' on the forest department, who had started the ball rolling on this method. However, it all ended up quietly, with a Canadian animal ecologist experimenting with colour-marking of lions to study the movements of lions.

The entirely new method of censusing lions was to begin. It was based on the theory that when a lion kills, he is less likely to stray far from his food and as a social or gregarious animal (found in small family-units), the entire pride of lions tend to gather at a kill and feast together and hence counting them would be easier. Secondly, since most of the Gir lions had become cattle-lifters or at least at some time had killed livestock, specially buffalo, they would be attracted to buffalo baits. If sufficient baits were tried throughout the forest, a large number of lions would kill and be counted with the advantage of recognising males, females and cubs. This would reveal a true appraisal of the minimum lion population.

On the 30th May and 1st June, the entire forest staff were deployed according to the zonal system adopted. Co-ordinators and Supervisors and their assistants were to select suitable sites for tying up baits and to arrange for their supervision. For the visual-count which was to commence on 2nd June, the Gir was divided into 5 zones each with a Co-ordinator, including the Sanctuary Superintendent, and each zone had at least 12 to 18 Blocks of about $12\frac{1}{4}$ square miles, each. Each Zone had been allotted at least 10 or more baits per day and the count was to continue for 5 days till June 6th. In all about 75 Blocks were included. About 300 to 400 baits were required. When a bait was killed, a night-and-day watch was kept to count the lions, with the instruction that duplication count of the same animal should not be included. In most cases, lions foregather soon after a kill is made and late-arrivals are rarely seen. The next day a fresh bait is tied at the same place and so forth and the same lions encouraged to kill, thus keeping them anchored in one location. During the Visual Census a large number of lions would be seen on their kills and thereby counted. In all the following days the same procedure would take place with minor changes. Where

a bait was not killed, it was moved to a more likely site where it had some chance of being killed by new lions. It is obvious that at the same site where lions have killed, the same lions would be seen on consecutive days, but if there were more or less, the Enumerators and Supervisors would check on adjoining blocks to see whether additional lions had joined those that had already killed to eliminate duplication. Such duties were very important, and as I watched through the census I noticed the hard work the Co-ordinators and Supervisors were doing.

There was much excitement on the first two days to see how many baits had been killed and by what number of lions. In this the 'lion-show' lions were first and foremost and appreciated the Buffalo-calf gifts. Then the cattle-lifting lions were showing up on kills. Thus the lion census opened up very well. However, one zone, the Eastern Gir Sector, gave us all a surprise, the entire team of 11 baits were still alive and standing for the first two days with not single kill. During these two days, the Chief Co-ordinator and myself covered as much ground as we could separately, to discover the reason for the non-registering of kills. Enquiries revealed that machans built to observe the lions were too close to the baits, where game-killing lions were more evident, and where the maldharies kept a close watch over their livestock. These forest guards on machans were also ordered to keep-off panthers from killing the baits and these factors did keep the lions away from the baits. On the third day as soon as the necessary changes were made kills commenced. Yet, a number of lions which were heard roaring did not come on the baits but were seen, and sexes identified, and these had to be added to the visual count, whereas, a few had made natural kills but could not be seen.

In this Zone, the maldharies in the past had evidently kept lions off their kills rather than permit them to be eaten, and it seemed to me that even poisoning of lions had taken place secretly, the lion population being thinner than in other zones. Once a lion becomes suspicious he is very difficult to lure to domestic bait and I feared that a number of lions had thus escaped detection. Nevertheless, these lions had been enrolled in the first phase. The list of kills made are not with me zone-wise and I cannot give an entire picture of baits killed. However, I felt satisfied at the end of the visual census of direct count that the results gave a correct number of lions actually seen on kills and in the field.

In the operation, baits had to be tied at about sunset time or just after, when prowling of lions commences in the hot season. Throughout the night, the 5 Co-ordinators, and the Supervisors with their subordinate staff kept a constant watch over the kills, checking and re-checking from one place to another, and also seeing that no duplication took place. I on my part commenced my work at 5-30 A.M. gathering information of kills made, checking whether they were lion or panther kills and seeing lions taking their last bite before retiring for their siesta; in some cases actually seeing the lions resting. I spent most of the day out with pack-lunch, assessing the situation where kills were not made, making enquiries of lion movements and picking up lion tracks and even seeing lions on the roadside and marking their positions in my diary. My work ended in the late evening, often by watching some lions

taking their first bite but no more, being dead-tired by nightfall. Sometimes, I was called up by the Deputy Minister to join his little party of friends and to brief him on the progress made. It was all very friendly, but I did suffer some late nights.

In this arduous and gruelling lion-census operation I must admire the part played by the entire forest department with the Chief Co-ordinator like a General conducting, helping and guiding all those who sought his assistance from time to time and being in the field as much as possible. There was no shouting of orders, every thing worked smoothly and splendidly, a sign of good organization. It was customary in the evening for me and the Chief Co-ordinator to meet and discuss the events of the day so that any required improvement for the following days could be made. Changing of sites of baits was one of the problems where no kills had taken place, and baits had to be sent forthwith where kills were being made daily. Transport to far reaching locations often became a problem. Quite a number of kills were made by large panthers but, by and large, it was the lions that killed the baits most. During the census I came across all the game animals of the Gir forest, but strangely not a single panther. Nevertheless, I saw many panther tracks and, of course some kills. This was I believe partly due to my work being in the day time. The Co-ordinators came across panthers, but not frequently, during the night. I personally felt that there were not many more panthers than lions in the forest, but they were largely distributed on the fringes and sparsely forested areas of the inner Gir hills.

Amongst the hoofed game, the Fourhorned Antelope and wild boar were less in number than I had seen in earlier days. Forest undergrowth and density of forest was much less but the game ungulates appeared fairly well balanced in proportion with the predators. And that in spite of certain amount of poaching by meat-eating people of the Gir forest and its environs. The last year had been a bad one and it was reported that a fair number of game animals had succumbed. In spite of that, I had seen quite a lot of game.

The direct count of lions by the visual method was a success, yet some of the results fell short of expectations. I had anticipated that and had mentioned it to the C.F. before the census. For instance, we could not issue a circular to all lions, that their dinner would be ready to be served at such and such a place. The lions had to *find* that out. The lion-show lions were well prepared for invitation calls, which the Foresters and Guards had trained their ears to listen to. For strange lions, any human noise or sound indicated 'danger': And a bait tied up in a remote part of the forest appeared rather a strange invitation for a lion-thief. All these factors came to the surface in this census. We tried our best to discover the 'rendez-vous' of family lions and tied up for them in those places. They did not always turn up, some were suspicious of the regular '*plate de jour*' and some gracefully left after their first meal. There were those who did not appear owing to previous engagements such as honeymoon couples, or were at natural kills in some remote forest ravine, and some lionesses were lost in the forest owing to maternity. In a visual count, if lions are seen where baits are not

killed, they should be registered. These were factors which one had to contend with. If the game-prey of lions had been densely populated, the results would have been, I feel, disappointing, because, lions would tend to feed on wild game, probably with greater ease, than attempting to steal or attack a domestic animal protected by its owner. However, with an efficient wildlife staff, natural kills could as well be located in the Gir type of forest where vultures and crows disclose the whereabouts of a fresh kill. Forest operations take much of the time of the Gir forest personnel and few are trained for wildlife observation. At the end of the census there were some sceptics who felt there survived only 90 to 100 lions. Perhaps, they were thinking of those adults that were seen on the roadside alone.

In ending my lion census Story, I would like to add that the Gir forest has become much sparser than I have known it in former years, and people have penetrated it from all directions, with rail-roads and highway-bus routes crossing the heart of the Gir. However, with these changes and others, I find the forest stands improved perhaps at the cost of wildlife depletion. Although the situation is not bad, it may take a drastic turn if strict care is not taken. The result of the Reconnaissance Survey or census by enumerating footprints of lions during the two days of May 28 and May 29, 1968 is: number of males 48, females 80, cubs 38, which gives the total of 166 lions.

The result of the direct visual count of lions taken from 2nd June to 6th June 1968 is as follows: Males 55, Females 56, Cubs 51 with the total of 162. This reveals that there are not less than 162 lions in the Gir Sanctuary and its environs. In view of the fact that certain lions were enumerated by their footprints in outlying isolated areas but were not seen in the visual count, these 15 lions of which five were males and 10 were females could be added to the total, making the grand total of 177 lions, which the Forest Department considers valid. The earlier lion censuses of 1950 and 1955 of which there are printed reports, show 219 to 227 lions (179 to 187 adults or sub-adults and 40 young animals) and from 290 to 314 lions; (141 males, 100 females, 49 cubs) respectively. And in the 1963 census of 285 lions, 82 were males, 134 females, 69 cubs.

The figure of 314 lions mentioned in the 1955 census shows 24 lions reported from the Bombay State area of the Gir, of the erstwhile Baroda State and its feudatories.

I personally do not think there was a sudden drop in the lion population, considering I attempted to estimate the number of lions in the Gir periodically. The decline has on the whole been slow and the prey of lions other than domestic livestock has been somewhat the same. Poaching has contributed to the decline of game ungulates and the wild boar has drastically been reduced, but holding its own quite well. The most sought after animal for meat appears to be the Fourhorned Antelope, whereas the chinkara has almost disappeared from the teak habitat. I hope future conservationists will look more closely into the predator-prey relationship and the vegetal ecosystems of the Gir forest.

EK-OMKAR

With best compliments

from



Ghaziabad Cold Storage & Ice Factory

D. M. ROAD, GHAZIABAD (U.P.)

Prop : Shri Sampuran Saw Mills

Delhi : 74953

"Timpack" Calcutta

Telephones : Calcutta : 23-8081/2

Telegrams : "Coolage" N. Delhi

Ghaziabad : 2067

"Coolage" Ghaziabad

Head Office :

8 & 9, Bentinck Street,

CALCUTTA-1

Local Office :

4-Friends Colony (West)

NEW DELHI-14

With Compliments

from

THE WESTERN INDIA MATCH CO., LTD.,

P. O. CLUTTERBUCKGANJ.

Bareilly, U. P.

PLYWOOD PRODUCTS

SITAPUR, U.P.

FOR 28 YEARS

Manufacturers of :

**PHENOL FORMALDEHYDE SYNTHETIC
RESIN BONDED PRODUCTS**

"SITABOARD"

—Flush Doors.

"SITALAM"

—Laminated wood windows.

"SITAFRAME"

—Laminated frame for doors and windows.

"SITAWOOD"

—Wood particle Board, for furniture Block Mounting and Concrete Shuttering.

"SITADOOR"

—Door for Low Cost Housing.

"SITATEX"

—Thermal/Acoustic Boards and Ceiling Tiles.

"SITAPLY"

—Decorative and Moulded Plywood.

FIRST IN THE FIELD AND STILL LEADING.

INFORMATION ON TIGER HUNTING

?

We could give you a lot of it.....but would prefer to let others do it. No one is better qualified to give this information than top International big game hunters who have hunted with us since 1951—some of them not only once but many times repeatedly. So why not ask them ? We can send you a long list of their names and addresses.

Phone : 271513

Cable : BIGGAME

Indian Shikar & Tours Private Ltd.

Officially recognized by the Govt. of India as Shikar Outfitters.

3/14-A, Asaf Ali Road, New Delhi - India

FIREX

THE GREAT NAME IN

 FIRE PROTECTION

LARGEST SALE IN INDIA

KOOVERJI DEVHI & CO., PRIVATE LIMITED

BOMBAY

DELHI

MADRAS

PLEASE VISIT

For Artistic Rajasthani Handicrafts in various forms and shapes with beautiful traditional designs. Items not only decorative, but of utility also :

RAJASTHAN HANDICRAFTS EMPORIUM

(A Govt. of Rajasthan Concern)

Mirza Ismail Road, Jaipur — Phone : 61912

48, T.C. Building, Connaught Place, New Delhi — Phone : 45490.

Near Nakki Lake, Mt. Abu — Phone : 96.

AND

SALES CONCERNS AT :

Ashoka Hotels Annexe, New Delhi.

200, New Delhi.

Airport, Udaipur.

* * * * *

Unit of :

The Rajasthan Small Industries Corporation Limited

(A Govt. of Rajasthan Concern)

K-18, Durgadass Path, Malviya Marg, 'C' Scheme

Post Box 180 — JAIPUR

**Dhariwal & Lalimli Woollen Goods, Blankets, Suitings, Grey Flannels
Knitting Yarn, and Wools. The Only places to visit:—**

Om Parkash & Sons,
1, Rajpur Road,
Dehra Dun.

Om Prakash Surendra Komar,
18-E. Connaught Place,
New Delhi.

Om Sons,
VI-5637
Nai Sarak,
Chandni Chowk
Delhi.

Om Sons Bargain Basement
5/8 Ajmal Khan Road,
Karolbagh
New Delhi-5

Om Sons Engineering Corporation,
2E/6 Jhandewalan Extension,
New Delhi.

Anandji's Dhariwal Mill Depot
New Market,
Amritsar.

Anand Sons,
2659 Gurdwara Road,
New Delhi.

Anand Prakash & Sons,
824, Nai Sarak, Delhi.

Madho Ram's
Mandelia Road,
Kamla Nagar, Delhi.

Whole Sale Depot.
Anand Prakash Om Hrakash,
Katra Meash Dass,
Nai Sarak Delhi.

Om Sons Durga Parshad,
XIV-4350, Pahari Dhiraj, Sadar Bazar,
Delhi.

Also Ajannta Textiles Mills Ltd. Ghaziabad.

R. S. MADHO RAM & SONS.

With the Compliments

OF

Balmer Lawrie & Co. Ltd.

CALCUTTA,

BOMBAY,

NEW DELHI,

ASANSOL.

Greetings

TO THE DELEGATES

From

KASHI RAM PHOOL CHAND

**Iron, Paint, Cement, Hardware &
Asbestos Cement Products.**

Phone : 3651

Post Box No. 21,
DEHRA DUN.

**RAJASTHAN STATE HOTELS CORP.
LIMITED**

With a chain of up-to-date Hotels fully equipped
with all modern amenities to suit your needs set in
ideal surroundings at

Jaipur, Udaipur, and Siliserh (Alwer)
easily reachable by Air, Road, and Rail

Invites you to

RAJASTHAN

The Colourful Land of Chivalry and
Valour rich in Tourist attraction of all
interests

**Shikar, Boating, Fishing, Lakes, Forts,
Temples, Palaces, Monuments, Game,
Sanctuaries.**

LAND WHERE BIRDS SING
AND TIGERS ROAR



CORBETT NATIONAL PARK

Situated in the Foothills of Himalayas - 180 Miles from Delhi. Connected by Rail & Roads; Tiger; Elephant; Deer Species; Panther; Sloth Bear; Crocodiles; Colourful & Song Birds; Vast Savannahs; Picturesque Landscape; Healthy Climate; Mahaseer Fishing; Electricity; Running Water; Sanitary Fittings; Bedding; Boarding; Elephant Ride; Guide Service.

FOREMOST PARK IN THE COUNTRY WITH MAXIMUM
COMFORTS AND VARIETY OF WILD LIFE

RESERVATIONS:

- (1) CHIEF WILD LIFE WARDEN,
17, RANA PRATAP MARG, LUCKNOW
PHONE 24434 - GRAM; WILD LIFE
- (2) TOURIST OFFICER, U.P. NIWAS
3, KAUTILYA LANE, CHANAKYAPURI, NEW DELHI
PHONE No. 75782, 72806



The Seed Corn: There is one quick way of bringing a farm to an end, and that is to rob the farmer of his seed corn. Out of each harvest, a farmer must put by a percentage of his corn to plant again in the next season. And if he has to expand and to plant new fields, then he must retain more and more of his crop to have more and more seed corn.

Profit is the seed corn of industry. As the corn grows and the seed increases, so profits flow out of industry. They are not a weed, to be scythed by the scythe of taxation or to be eradicated by the hoe of nationalization. They are the measure of an industry's efficiency. They are the new power generated by that industry for the creation of further industries.

TATA ENTERPRISES

The Dudhwa Sanctuary

By

KR. ARJAN SINGH

The latest sanctuary to be formed in the State of Uttar Pradesh may prove to be the turning point for the swamp deer in his fight for survival. The District of Kheri adjoins the Nepal border, and it is here that the herds reached the optimum in numbers. Exceedingly gregarious, with herds numbering over a thousand, their habitat was the marshy tracts and savanas, mostly in the trans-Sarda belt. It was a revealing sight to walk a line of elephants through the thick Jhau (Tamarisk) on the river bank to hear the thunder of innumerable hooves and the waving of the tall grasses as five hundred or more swamp deer surged forward and splashed through the numerous rivulets intersecting the grass belts, amid a veritable forest of antlers. This was the setting for viceregal and gubernatorial shoots of prewar India. The Stable of Singahi elephants mounted by V.I.P. guests gunned down the best specimens of this confiding deer. The trophy was removed and the carcass left to nature's scavengers. Such was the revolting sport for which princely India was famous. However even these orgies do not seem to have made much difference to the reproduction of the species and the late forties and early fifties had much in the shop-window.

The millenium has come with the land-hungry advance of the seething population and the issue of crop-protection firearms as political patronage. Driven back by the relentless advance of civilisation, decimated by firearms, their habitat reclaimed, and breeding grounds burnt for agricultural purposes, only a small fraction can be accommodated in the forest areas, and even this will entail much modification in habitat and grazing grounds. Mirchia jheel bordering Nepal, and noted for its fabulous number of swamp deer, is now surrounded by cultivation and may afford shelter to a few hinds. The last stronghold was Ghola, a semi-marshy tract of 3000 acres, and as late as 1965 contained about 700-800 swamp deer as estimated by Dr. Schaller, an eminent wild life ecologist from America. However, the area, though adjoining the reserved forest, was privately owned, and though I suggested at the first meeting of the State Board for Wild Life in 1964 and at every other available opportunity, that this land which was going to be declared surplus under the land-cieling act should be taken over by the Forest Department, and though government accepted the principle, unscrupulous land-grabbers were quicker in practice, and all cultivable land was soon under the plough. In June 1966 when I visited the area prior to the outbreak of the rains the few remaining pools of water were littered with the carcasses of animals wounded by trigger-happy crop-protectionists (sic) which had crawled away to the nearest water to die. It was a desolate scene and one which I have not revisited.

Fortunately, the few that escaped the holocaust went into the Dudhwa forest range, and one morning from a platform high up in a Semul (*Bombax malabaricum*) I saw a pitiful herd of some forty swamp deer huddled into a corner of a plain which seethed with grazing cattle. This was a remnant of the mighty herds which once roamed the marshlands, and for a moment their fate swung in the balance, as disease transmitted by these bony scrub-cattle could well bring the species to the point of no return. But fate was kind, and the immediate declaration of the Dudhwa Sanctuary of 82.2 sq. miles and the exclusion of cattle grazing by a very sympathetic Forest Minister has saved a species from near-extinction.

The Sanctuary has been in existence for about two years, and the platform on the Semul tree may now reveal a herd of over five hundred swamp deer grazing in unrestricted freedom, and though the war has not been won, as cultivation surrounds the area, and poachers lurk in every bush, yet it may be the end of the beginning. The beginning when a species threatened with extermination was saved by timely protection. The reproduction processes are good, and it is my estimate that over a thousand swamp deer exist in the ten square miles of the nucleus sanctuary.

Unfortunately at present the corollary of wildlife is hunting, and the camera has yet to replace the gun as a means of popular sport, but it is a growing hope that more people are realising that the law of diminishing returns has set in for our wildlife cycle, and unless this evolution takes place soon we are going to lose a precious heritage.

After the location of the swamp deer mentioned above I endeavoured to attract them by ploughing up areas of land as viewing grounds and constructing artificial salt licks consisting of a mixture of common salt and clay. This has proved a great attraction to swamp deer, chital and hog deer, who frequent the licks at night during the winter, and by day, once the grasses are burnt. After February they may be seen at all hours of the day grazing on the new shoots of grass. Until March the three species may graze together, but once the weather starts getting warm, the chital and hog deer forsake the open for the shade of the forest during the day. Swamp deer on the other hand stay in the open till mid-June and shelter under the sparse shade offered by khair (*Acacia catechu*) shisham (*Dalbergia sissoo*) and other miscellaneous trees which stand in isolation on the grassy plain. Once the first monsoon showers have fallen, the cattle-flies force them to retreat into the forest. The plantation of perennial fodder-grasses like Giant Napier is an experiment which I hope to start to determine to what extent this will help in their localisation for photographic purposes, in view of the predators which have a healthy effect of scattering the deer population, which would tend to congregate, causing a danger of overgrazing and also of widespread infection in case of an outbreak of epidemic.

In the wake of an extensive deer population come the predators, which now only consist of the tiger, as it is an urgent aside that panthers seem to be a vanishing tribe. The reason





Swamp Deer herd

Photo—Arjan Singh.

can only be attributed to poaching as for such an adaptable species to disappear must have a cogent reason and an immediate survey should be conducted by the Wild Life Department aided by the Wild Life Preservation Society to determine why this once-prolific species seems to be on the edge of limbo. A panther-skin coat can fetch 4000 dollars in the foreign market and a widespread net from Forest Officer to taxidermist to Customs official must be cast to prevent this iniquitous export.

The tiger is fairly immune from the average poacher. Cases of wounding and the resultant man-eater do occur, but usually the ill-armed gunman, is loath to try conclusions with the mighty feline, and the cause of his decline though less spectacular must be attributed to destruction of food, of habitat and the avid hunger for dollars which is placing our foremost animal in such jeopardy.

I will now refer briefly to the efforts I have made towards the study of the tiger, and the success that has attended these efforts. I have erected a semi-permanent structure which has a controlled-lighting switch which can regulate 3 kilowatts of lighting to illuminate a central peg for tethering a buffalo bait. Schaller at Kanha National Park claimed that the taking of 5 bait was sufficient to attract a tigress and grown cubs enough to make them rely on this localized feeding arrangement. This was probably due to easily obtained food for a large family, as the presence of swamp deer, chital and gaur would not indicate any paucity of wild game, for the tiger in the illustration has taken over forty bait in the last two years from the picket in front of the platform. During the first season of this 'training' the tiger would kill the bait and feed, but he would not return the second night unless the tethering rope was such that he could remove the carcass to cover of his own choice. Even a long rope did not constitute a sufficient illusion of a drag, and he would abandon the kill. During the current season he has been more amenable and will return to the remaining carcass to feed at the stake, and it is hoped that eventually lighting may be used for cinematography. Currently I have abandoned the tying of bait due to the rains, and one cannot help feeling rather mean as I wonder at the thought processes that go with the passage of those great pugs which circle the killing picket every now and again! The tigress who frequents the area will not take a tethered bait, and has stood and looked at the buffalo calf, preferring the deer in the area, as probably does the tiger, as he will disappear for days on end. A transient tiger, which also kills occasionally at this site, is smaller in size and is tolerated as the dominance order has been established, but when another large tiger killed, there was a fight and much blood and hair before the 'status quo' was restored.

The future outlook however is sombre. The Reserved Forests are all the habitat that remain to our wildlife, and that accommodation is only 13% of our land mass, whereas indigenous and foreign experts recommend a minimum 30%. This desirable status will now never come to pass, as cultivation has not only spread to the verge of the forest, but

unscrupulous elements with the connivance of the lower forest staff have encroached deep into the forest boundary itself, and the present political set-up, bedevilled as it is with factionalism, would never dare dispossess the prospective voter, even for the future economy of the country.

The move to introduce eucalyptus as a commercial timber with a quick turnover is itself going to militate against any stable wildlife population and will do much towards the extirpation of the sal (*Shorea robusta*) which will be a natural concomitant because of its slow process of maturity and the replacement of its use by iron and steel. Also, the natural regeneration of the sal seems to have stopped in certain areas. It will be a sad day when this magnificent timber is destroyed in the rush to ascribe a commercial value to every human contact, and the velvet green summer foliage offering shade to a myriad species of bird and animal life from its, 150 feet eminence is replaced by an exotic plant having a commercial turnover of 30 years, but of little value as shelter for wild life, or against the eroding properties of the elements, or indeed of the aesthetic grandeur of mature sal.

Wildlife will only live if it can display a commercial value, which is the decree of a developing economy, and uptil now the dollar earning capacity is only displayed by the destructive 'shikar' companies. The central attraction is the tiger, and to my mind the animal is doomed within the next decade unless it can display a tourist potential as a photographic subject and thus earn more than nominal protection from government. It is too late, and too optimistic, to hope that public opinion in an under-nourished and agricultural country will ever rally to save wildlife. Tiger photography is a very arduous, but also a very rewarding sport, and the trophy is immeasurably more valuable than a skin on the wall, and the subject may be shot again and again. Africa has awoken to the crime of its vanishing wildlife, and their heritage was larger than ours. Their major National Parks are of 8000 sq. miles with highly organised tourist facilities and their revenues are commensurate with the effort. Is our exploding population going to swamp its own existence or will we realise before it is too late that our national wildlife heritage cannot be replaced by the hand of man, or the relaxation of nature substituted by the air-conditioned cinema!

India's Wildlife Heritage Faces Extinction

By

H.H. YESHWANTRAO H. GHORPADE OF SANDUR
Southern Regional Secretary, Indian Board for Wild Life

India's Wild Life heritage faces extinction. It is, therefore, heartening that the Government of India have re-constituted the Indian Board for Wild Life to consider ways and means to conserve it. If it succeeds, our descendants will have the pleasure of seeing wild animals and birds. If it fails they will be forced to live in a world where the only living creature will be man himself—and that is not too happy a thought:—always assuming, of course, that we don't destroy ourselves in the meantime by letting loose the fury of atomic weapons.

Since the time of the edicts of Ashoka, ordaining the protection of wild animals and birds, hundreds of animals and birds have become extinct. Species that took at least a million years to develop—destroyed for ever !

Let me remind you that the beautiful blackbuck—one of the most beautiful antelopes of the world—and the chinkara—the only gazelle found in India,—are very nearly exterminated—not as pests, but for sale of meat and for fun—in less than twenty years.

Today, there are hundreds of species of animals and birds in danger of extermination by the sheer callousness of man. Ironically, the noble Lion, proud emblem of free India, is itself on the list.

I am not going to bore you with the names of hundreds of our wild animals and birds, but it may interest you to know just why some of them are under sentence of death.

Birds like the peafowl, bustard, jungle fowl, and partridge are being netted and killed because they are good eating, and the plumes and feathers of some find a good market. The rhino owes its danger to the fact that some believe its horn is aphrodisiacal. This may have made some sense years ago, in the days when mankind was the victim of superstition, and the odds were a bit more even, but today, when parties go out killing with modern contrivances, the whole thing becomes sheer folly. The crocodile is facing destruction because its hide makes beautiful handbags for ladies, and other articles.

The following, to my mind, are the reasons why wildlife is in danger in India:—

I. Physical conditions are changing; human population is increasing, forcing the animals out from their natural habitat. Industry and science are polluting the air, the soil, and the water—unintentionally though it may be—but none the less effectively killing off vast numbers of animals, birds, and fish.

II. The means of controlling these creatures which are considered vermin are very much more powerful than ever before. They are in fact no longer means of control; they are methods of extermination. Even then things might not be so bad if they only affected the so-called pests; the trouble is that they set up chain reactions in nature which affect many innocent creatures and in some cases man himself.

III. There are the killers for profit, the poachers, the get-rich-quick-at-any-cost crowd. These thoughtless exploiters are slaughtering vast numbers of animals and birds merely because they can get a few rupees for their meat, ivory, horn or hide, from a middleman who sells it to a receiver for double that. He in turn gets a few additional rupees from an illegal dealer who charges the customers fancy prices. Thousands of animals and birds each year are being killed merely because the game-laws cannot be enforced and people want luxuries in life.

IV. The village 'shikaris'. These people with packs of dogs, prowl round the forests in moonlight—they also sit up on water holes—killing everything that moves.

These killers are at work all over the Indian villages. You may condemn killing for sport, but at least the sportsman is concerned that the source of his sport is not destroyed; the village hunters with packs of dogs couldn't care less.

V. Wanton destruction of wildlife, in the name of crops by means of weapons licensed for crop protection. I have no hesitation in saying that stray cattle can do more harm to crops than wild animals which normally inhabit the forests. Mr. Nehru said somewhere that: "Cattle are let loose and become wild and become a danger not only to crops, but to human beings also."

VI. Most important are the inadequate game laws and the poor will to enforce them. The socialistic pattern of society may appear to demand the equal and unlimited right to kill animals; but it does not seem much like natural justice if it results in the extermination of species. Conservation may mean complete protection, but not necessarily. In most cases it means proper control. The mistake so often made by the ill-informed and the sentimental is that they are unable to see the difference between controlled conservation and indiscriminate destruction.

The moral reasons for conservation must be obvious. After all we quite rightly collect vast sums of money and go to endless trouble to preserve man-made treasures, most of which serve no practical purpose. Surely then, we should also pay some attention to the living God-made treasures of the world which have a practical as well as an aesthetic value.

Theodore Roosevelt put this idea in this way: "The nation behaves well if it treats the national resources as assets, which it must turn over to the next generation increased and not

impaired in value". Kautilya's Arthashastra, written about 300 B.C., prescribed protected forests for protecting certain mammals, birds and fish. Such forests were known as "Abhayaranya". Twenty six years after King Ashoka's coronation, about 242 B.C., an edict of Ashoka (pillar edict V) decreed that certain animals, birds and fish were not to be killed. In spite of this age-old tradition of protection of wildlife, today these great concepts of nature conservation seem to be forgotten, and a dark doom of extinction threatens. The only ray of hope is that the Government of India has realised the danger.

The problem the Indian Board for Wild Life is trying to tackle is stupendous, and it needs money and authority on the same scale. It involves educating people, influencing governments, enforcing laws, initiating ecological and biological research, conducting surveys and sometimes even buying land for propagating threatened animal species in captivity—rather like Noah.

The problem is particularly acute in India where the economics of a developing country are under considerable strain as it is. It is not as if our leaders did not understand. For instance, our undisputed leader, late Prime Minister Jawaharlal Nehru of revered memory, stated in the foreword to Mr. E.P. Gee's book—The Wild life of India, thus:—

"I welcome this new interest in India in the preservation of Wild Lifelife would become very dull and colourless if we did not have these magnificent animals and birds to look at and to play with.....Our forests are essential for us from many points of view. Let us preserve them. As it is we have destroyed them far too much. It is true that as population grows the need for greater food production becomes necessary. But this should be by more intensive cultivation and not by destruction of forests which play a vital part in the nation's economy."

Even so, the Indian Board for Wild Life cannot hope to succeed on its own. What is needed above all, are people all over India who understand the problem and really care about it. People with courage to see that the letter and the spirit of conservation and game laws are obeyed and, where necessary, improved. People who care enough to bring up their children to have a proper respect and appreciation for wild animals and birds.

Not just a few people, here and there, but literally hundreds of thousands of ordinary people, as well as naturalists and sportsmen, game wardens and zoologists, so that we shall be able to say with satisfaction that, at least in this one endeavour, we were able to correct our mistakes in time by a conscious and deliberate effort of will and generosity.

Before I close I wish to reiterate that the Indian Board for Wild Life as at present constituted cannot achieve as much as it wants to, without funds and statutory authority, and I hope that effective steps would be taken by all concerned to ensure that the Indian Board for Wild Life is able to function as an effective organization for the preservation of our wildlife.

Tiger Preservation

By

A. IMAM

Hazaribagh

Unlike the Pyramids of Egypt, wildlife, if protected from destruction, is not necessarily thereby guaranteed existence. Animals must in the fulness of time die, and the only way to guarantee the continuance of a species is to provide for it the right habitat so that the cycle of death, birth and death can continue. Mere protection from destruction is a negative approach.

In the U.S.A., where the "harvest" of deer runs into millions every year and where many millions of people hunt every year, the emphasis on habitat, rather than on "Thou shalt not hunt", has resulted in more deer today in the country than centuries ago, when the entire country was a wilderness. In some States, in order to keep the deer population down, certain seasons are open for hornless deer only, in order that females may be killed off and the optimum deer population obtained.

In India, in Assam, some 700 to 800 wild elephants are captured annually (the authorities permit about 1000 elephant captures a year), and this has been going on for a hundred years and more, yet the supply of wild elephants does not seem to diminish. Considering that the wild elephant is a protected species, can one consider the uproar there would be by armchair conservationists if some 700 to 800 wild elephants were shot each year? Yet the capturing of a like number annually must diminish the supply exactly as if such a number were shot. The fact that there is little impact on the supply of wild elephants is due to the right habitat for the existence and breeding of wild elephants not only in Assam but in the contiguous jungles of Bhutan, NEFA, Nagaland, Manipur, Tripura, Burma and down into South East Asia. 700 to 800 elephants per year may be captured in Assam, but the jungles stretching into South East Asia are ideal, too, for breeding and keep replenishing the stock, elephant population adjustments taking place independent of inter-State and inter-National boundaries. So, right at home we have proof of the importance of habitat, vis-a-vis so called "protection", the last having but limited value when you consider that in any event the life of an animal is limited.

We may now deal with the subject of this article, the tiger. Considering how difficult the hunting is of this shy and elusive quarry, there is less fear of the species being 'shot' out. The real danger to the species is from his vanishing habitat. A tigress breeds once in two years, giving on an average a litter of 4 cubs. Assuming an infant mortality rate of 50% every tigress should yield an average of 1 cub a year. If we have 4,000 to 6,000 tigers in

India, say 5,000 tigers, and if we assume tigresses to be half that number, we get the figure of 2,500 tigresses producing 2,500 tiger cubs a year. Taking the natural life of a tiger at 25 years we get a natural mortality rate of 4% or 200 tigers dying due to natural causes. This, against a breeding rate of 2,500 tigers per annum, which leaves 2,300 tigers per annum which may be shot without decreasing the present tiger population of India. I doubt whether 500 tigers a year are actually shot. There ought to be, therefore, no fear for our tiger population *assuming the right habitat for breeding*.

However, I can positively assert that with the exception of the terai and bhabar belt running along the foot of the Himalayas from western Uttar Pradesh through Nepal and North Bengal into Assam, and once there in all the forests of Assam, Bhutan, NEFA, Nagaland, Manipur, Tripura, Burma, Thailand, Vietnam and the rest of South East Asia, the remaining areas where we get tigers, i.e., the jungles of the Indian peninsula, are being devastated. Already these jungles are far from ideal for the breeding of the species. In these areas the future of the tiger is problematic.

The dense jungles of the terai in U.P., Nepal, North Bihar, North Bengal and Assam are ideal breeding ground for tiger, as are the dense jungles of Bhutan, Assam outside the Terai belt, NEFA, Nagaland, Manipur, Tripura, Burma and South East Asia. If these jungles can permit of some 700 to 800 elephants being captured annually in Assam, these jungles can certainly guarantee the perpetuation of the tiger in them. Owing to the nature of these jungles hunting tiger, always a difficult matter, is even more difficult, and the numbers which are shot are insignificant. The deathroll will be mainly determined by natural deaths. But with such magnificent breeding grounds, the numbers ought to and, in my opinion, do increase. Most sportsmen are aware that a tiger is a solitary animal and has a definite beat which he jealously guards. However, there is no question that in Assam and north-eastern India tigers *do not* have definite beats which are the sole prerogative of a single tiger. In these jungles several tigers will be found all moving about in a comparatively restricted area.

I have run shoots in which four full grown male tigers, not being members of a family, have all been shot within a radius of 1 mile in only 4 days. Some decades ago the Raja of Gauripore, in Assam, shot 3 ten-foot-tigers in one day, all within half a mile of each other. Last year I ran a shoot in Assam in which a pair of tigers were shot in a beat and the next day another full-grown male tiger was shot in that very same beat. The reason why tigers in north-eastern India do not conform to the rule of a single male tiger jealously guarding his own territory, is that ideal breeding grounds assure a density of population where a certain bit of territory to every male tiger is not possible. However, the density of the jungles makes tiger hunting extremely difficult.

I have already indicated that I feel that the forests of the Indian peninsula proper are no longer good breeding grounds for tiger. We might consider what habitat a tiger would

require in the type of jungles one has in the Indian peninsula. Here the dense jungles of north-eastern India are unknown. The jungle, tree and scrub, is very much lighter, with hills, raviness and caves to give a tigress-with-cubs shelter. We must remember that a tiger needs cover at ground level, and also shade. To those who think that a jungle is a forest is a jungle, I shall ask them to visit a central Indian jungle, as in Bihar, in April May. They will find it quite a task getting a little shade anywhere.

In such jungles in the past a tigress-with-cubs kept her progeny in, perhaps, a narrow ravine, but the trees on the banks gave the requisite shade. Today the forests have been devastated to such an extent that while the ravine might be there, the shade, in May, will not be there. Under such circumstances a full grown tiger could exist with discomfort in the hot weather but the cubs could not survive. The same is true of the hills, and while the odd cave might give shelter to a tigress-with-cubs, caves with little forest cover are hardly suited to tigers, though they will do admirably for leopards. If any reader doubts my statement I advise that he go to, say, a Bihar "forest" in May with a bottle of cold beer and try and find a suitable shady place where he may have his drink and then a well-earned midday sleep. I am willing to wager that he will be hard put to find any such place, things being as they are.

So far as the Indian peninsula is concerned, the writing is on the wall. The greed for timber has devastated our forests and without the right habitat the tiger cannot perpetuate itself in these areas. So called "protection" is no use when you realise that there must be a natural mortality rate. Fortunately, the jungles of the north-east are far from being fully exploited for timber and for this reason alone the tiger will be with us there as long as these jungles remain. I expect from reports that the adjacent jungles of Burma and South East Asia will for the same reasons continue to harbour tigers in the foreseeable future. Considering that re-adjustment of animal populations can and does take place independent of State and inter-National boundaries, the state of adjacent jungles in Burma and South East Asia is certainly of consequence to us.

(Mr. Imam, who is a knowledgeable and genuinely sporting and legitimate 'shikar outfitter', raises very interesting, if debateable, points, with which the Editors are not necessarily in agreement.....Ed.).

Kaziranga Through Sixteen Years

By

DR. ROBIN BANERJEE

Hony. Regional Secretary, Eastern Region, I.B.W.L.

The area, which in 1908 was declared as a Reserved forest, is now 61 years old. The one-time game-sanctuary is now known as Kaziranga Wild Life Sanctuary, and very soon it will be declared as one of the National Parks of India. Its 166-odd sq. miles of swampy, flat land is bounded by the river Brahmaputra on its northern side, and by the trunk road on its southern side. It is a delightful haven for wild animals, situated at an altitude of 250 feet above sea level, with an annual rainfall of 80 inches. The tall 'elephant'-grasses of Kaziranga serve as wonderful shelter for the great Indian One-Horned Rhinoceros, (*Rhinoceros unicornis*), the magnificent wild buffaloes, the regal tiger, the elephant, various species of deer, the occasional leopard, and ber, with whom the tourist can play a game of "peek-a-boo" if he goes inside. In addition, Kaziranga offers the visitor a variety of colourful birds like kingfishers, floricans, partridge, various species of storks and ducks.

In the year 1960, I discovered a colony of breeding pelicans on the bank of the Brahmaputra called Bhorilemara which was completely washed away by the river a year later. This was the first discovery of a Pelicanery at Kaziranga. Since then, I have found two more colonies inside the sanctuary, which is a record in Assam. The last one was discovered by Mr. Gee at Kalamuru, Andhra. To top them all, Kaziranga happens to be exceptionally rich in orchids, flame-of-the forest, silk cotton trees, etc., the gorgeous colour of which against the beautiful blue sky, reminds the visitors of lovely paintings and again in certain months of the year, specially after the rain, when the atmosphere is nice and clear of dust, the tourist can see the glimpse of snow-covered peak of Gari Chen Range of the Eastern Himalaya one hundred and ten miles away.

During recent years, Kaziranga has been losing its rhinos and deer. Rhino are being poached in ever-increasing numbers for their horns. At present, the Sanctuary is completely devoid of Indian gaur, which once roamed freely inside. Devoid-but not quite. A visitor to the forest office, at Kohora, can see three of their skulls adorning the walls,—the remnants of a species of powerful beasts.

Although several laboratories of the world have disproved Emperor Babar's belief, that rhinos are still being slaughtered for the mythical aphrodisiac value of their horn. Deer are also killed by poachers, specially during the festive season, and also during the floods when poor little animals often cross the road to come to higher ground for safety; the cruel hands of humans only lurk in the bush to finish the tired animal off.

This is the problem which is facing India today. This is the problem of wildlife and its preservation. Unless measures are taken to this end, it will not be long before it will be lost to us and to the generations that follow. Today 277 mammals are in danger of extinction and also 321 birds. The report is published by the Survival Service Commission of the International Union for Conservation of Nature, in collaboration with the International Council of Bird Preservation, in their book called The Red Data Book, which will tell you also all the facts and causes of decline.

Why is our wildlife vanishing everywhere in India ? The answer to this question is "This is democracy, and animals do not have votes" hence our mute animal citizens and their environment are very often neglected completely by the leaders of the country, due to preoccupation with other problems. The valuable national heritage slowly vanishes without notice till one day it is extinct. The emergence of modern arms and ammunition, followed by rapid modes of clearing the jungle, have proved fatal to our wildlife, as they get very little chance of survival. The settlers and graziers on the buffer zone of the forest are to-day Kaziranga's big informers of rhino movement, thus help in poaching. No law can shift them. It will be a shameful day for us when the next generation will ask "What was wildlife?" After all, we should not forget that we are the present trustees and should be fully responsible for their protection.

My strong suggestion is that instead of introducing new laws, the existing ones should be implemented, and a healthy public opinion stirred up, through film-shows, and publicity, and a whole-time person dealing with this subject at the central ministry be appointed, before it is too late.

जंगली हाथियों के बीच

रामेश बेदी

सुबह पाँच बजे हम कैम्प से चले थे। टाँगें थका देने वाली खोज के बाद साढ़े आठ बजे हम हाथियों की जगह पहुँच गये। हाथी फैले हुए थे और घास खा रहे थे। दस-बारह साल का एक पट्टा आठ-नौ बरस की हथिनी के साथ जोड़ा बना रहा था। भुण्ड में यह सबसे आगे था। ऐसा लगता था कि यह भी उत्सव में सम्पन्न किया जाने वाला गर्भाधान संस्कार है जिसमें मिथुन को जुलूस की अगवानी करने का गौरव प्रदान किया गया है।

सबसे बड़ा दन्तुर पश्चिम में जरा दूरी पर था वह घास चरता हुआ हमारी ओर बढ़ रहा था। दाहिनी ओर दो अन्य बड़े दन्तुर भुण्ड से अलग चर रहे थे। एक दाँत वाला एक हाथी भुण्ड से हटकर उत्तर में खड़ा था। डील-डौल में यह एकदन्ता वैसा ही था जैसा कि पहला हाथी गजानन गणेश का क्योंकि एक ही दाँत होता है इसलिए एकदन्ते हाथी को अनेक जगह गणेश कहते हैं आज यह मस्ती में आया हुआ था।

बड़ा दन्तुर अब उस टेकरी पर चढ़ रहा था जिस पर हम खड़े थे। हमारा भागने का रास्ता कुछ इस तरह रुक गया था कि नीचे छलाँग मारकर भागने के अलावा कोई विकल्प नहीं था। हमने यही किया। उसके बाद घास में दुबक कर बढ़ते हुए हमने एक फलाँग का रास्ता तय किया और पूरब की पहाड़ी पर चढ़ गये। घूमकर हम एकदन्ते के सामने आ गये।

दानों से बहते हुए मद से इसके कपोल भीगे हुए थे। इसका दाँत ढाई फीट लम्बा रहा होगा। इसका ढाई फीट लम्बा शिश्न भी बाहर लटक रहा था जो करीब-करीब घरती को छू रहा था। अपने सिर को वह ऊपर उठाता, मुँह खोलता और आधी सूण्ड उठाकर मस्ती में दायें-बायें झूमता। रुक-रुक कर घास खाना, पैर की ठोकर से मिट्टी खोदकर शरीर पर फेंकना, सूण्ड की नीलकाओं में मिट्टी भरकर फुकनाल की तरह देह पर फेंकना, अंगड़ाइयाँ और जम्भाइयाँ लेना, सूण्ड के सिरे को हवा में तैराते हुए गन्धों को पकड़ने की कोशिश करना, हमारी उपस्थिति का जरा सा भान हो जाने पर फड़फड़ाते कानों को रोक कर हमें देखने की चेष्टा करना—ये थीं कुछ हरकतें जो मैंने इस गणेश को डेढ़ घण्टे तक करते देखा। दक्खिन में चुगते हुए दोनों दन्तुरों को इधर आने से रोकने में यह सजग था। उसकी आँखों के हावभाव को पढ़ने के लिए दूरबीन बड़ी मददगार थी।

भुण्ड में जो हथिनी जोड़ा बना रही थी वह इतनी छोटी थी कि शायद इसके भारी बोझ को न सम्भाल पाती। इसलिए यह उससे जोड़ा नहीं बना रहा था। इस हथिनी का यह पहला सम्भोग रहा होगा। दो-तीन बार हाथी रतिकर्म में प्रवृत्त हो सका, भुण्ड धीरे-धीरे आगे बढ़ता जा रहा था।

इस घाटी में पहुँचने पर आज सबसे पहले इसी दृश्य ने मुझे आकृष्ट किया था। फोटोग्राफिक दृष्टि से प्रकाश का स्रोत यद्यपि आदर्श नहीं था परन्तु यह एक दुर्लभ दृश्य था, इसलिए हमने कुछ फोटो ले ही लिए। वन्य-जीवन की इस घटना के फोटोग्राफिक रिकार्ड दुनियाँ में बहुत कम हैं। मैं नहीं कह सकता कि मेरे पहुँचने से पहले ये प्राणी कब से काम चेष्टाओं में आसक्त रहे होंगे।

दस बजने के साथ-साथ सूर्य की किरणों की तेजी ने हवा को गरम कर दिया था। साल, पीपल और शीशम से बने एक झुरमुट में हाथी एक-एक करके जमा होने लगे। दोनों बड़े दन्तुर और गणेश भी वहाँ चला गया।

गरमी में आई हुई हथिनी से जोड़ा बनाने के इरादे से एक पट्टा उसके पास आया। पहले वाले हाथी ने उसे खदेड़ दिया। दोनों की लड़ाई ठन गई। वे ऊँची चिंघाड़ मारने लगे। एक दूसरे को धकेलने लगे। उनसे टकरा कर पेड़ टूटने लगे जिनकी आवाजें पीपलसोती में जोर से गूँज उठी। अपने उद्दन्तों को दूसरे के मस्तक में गाड़कर वे उसे पहाड़ तक धकेल कर ले जाते।

झुरमुट के एक बाजू पर धूप आने लगी। वहाँ खड़े हाथी झुण्ड से अलग निकल कर दूसरे पेड़ों की छाया में खड़े हो गये। झुरमुट के पश्चिम में टीले पर साल का एक मोटा पेड़ खड़ा था। इसकी छाया के नीचे पन्द्रह हाथी ऊँघ रहे थे। इनमें कुछ बच्चे भी थे।

मेरे कैमरे की रेंज से सभी हाथी दूर निकल गये थे। इसलिए मैंने भी अपनी जगह छोड़ी और पहाड़ियों पर दुबकता हुआ महासाल के टीले पर पहुँच गया। मेरे से हाथी पन्द्रह गज की दूरी पर रह गये।

हवा तेज हो गई और उसका रुख बदल गया। हमारी ओर से वह हाथियों की ओर जाने लगी। इससे हमारी गन्ध उन्हें मिल गई और वह बच्चों वाला झुण्ड भाग खड़ा हुआ।

पहले हम जिस टीले पर बैठे थे वहाँ से भी एकदन्ता हमारे से कुल पन्द्रह फीट की दूरी पर खड़ा मिट्टी में स्नान कर रहा था। वह इतनी जोर से मिट्टी फेंकता कि हमारे पास आकर गिरती। साल के सूखे पत्तों पर मिट्टी के कण गिरते हुए ऐसी आवाज पैदा करते मानो बारिश हो रही हो। धूल से बचाने के लिए हम कैमरे को अपनी बुशट के नीचे छिपा लेते थे।

ग्यारह बजे तक इधर-उधर बिखरे हुए इकले-दुकले हाथी भी झुरमुट के नीचे छाया में जमा हो गये थे। मेरे साथ आने वाले दोनों खोजी भी सवा ग्यारह बजे सो गये थे।

सोते समय प्रायः सभी हाथियों की सूँड़ें बाहर की ओर तथा उनके पिछवाड़े पेड़ के तने की तरफ रहते हैं। सुरक्षा के लिहाज से यह सावधानी बरती जाती है। हाथी का शरीर तो भारी होता है और उसे मुड़ने में भी समय लगता है इसलिए वह पहले से ही इस तरह खड़ा रहता है कि बाहर से दुश्मन का हमला हो तो वह भट मुकाबला कर सके।

कल इन पहाड़ों पर आग लगी थी जिसने सूखे पत्तों और घास को आत्मसात कर लिया था। धरती रुण्ड-मुण्ड हो गई थी। हमारे हाथियों के निरीक्षण में यह बात सहायक सिद्ध हुई क्योंकि हम बिना आहट के मजे से उनका पीछा कर रहे थे।

कुछ देर के लिए जब ये गाढ़ी नींद में चले जाते हैं तो इनके कान भी स्थिर हो जाते हैं। बीच-बीच में कोई हाथी अपनी देह पर मिट्टी फेंक लेता है।

काले मद वाला एकदन्ता गणेश हथिनियों के बीच में खड़ा ऊँघ रहा था। अपने सिर के भारी बोझ को च्छा न पा सकने के कारण वह भूरे रंग की एक हथिनी की पीठ पर अपने उद्दन्त और सूण्ड को टिका देता था।

बोझ सम्भाल न सकने के कारण वह भी आगे खिसक जाती थी। नींद खुलते ही वह मस्ती के कारनामे दिखाने लगा। साढ़े बारह बजे वह पेड़ों के तिरछे तनों पर अगले पैर रखकर ऊँची टहनियाँ तोड़ने में लग गया था। रुइणा के एक ऊँचे पेड़ के साथ उसने अपना उद्दन्त टिकाया और जोर लगाकर एक ही झटके में गिरा दिया। गिरते हुए पेड़ के नीचे दब जाने के भय से कुछ हाथी भुरमुट से बाहर भाग खड़े हुए। उसके मद की मात्रा इतनी बढ़ गई थी कि कपोलों से नीचे टपकने लगा था। उसकी मदोन्मत्ता शरारतों को देखकर आसपास के हाथी जगह खाली कर गये। उसने फिर सूण्ड उठाई और खूब ऊँची एक डाली को पकड़ने की कोशिश करने लगा। फिर वह एक रोहिणी के पेड़ पर जोर आजमाई करने लगा। चरमराता हुआ पेड़ नीचे आ गिरा। सभी हाथी भाग खड़े हुए। गिरे हुए पेड़ की टहनियों और बकल को खाने में वह जुट गया। बाकी के हाथी इसे अकेला छोड़कर दूसरे पेड़ों के नीचे छाया में खड़े हो गये।

मैं इस समय इस हाथी से पचास-साठ फीट की दूरी पर एक शीशम के तने के पीछे छिपा हुआ दूरबीन से इसके मस्तक को देख रहा था। इसका बहता हुआ मद टेढ़ीमेढ़ी काली धारा दीखती थी। फुटे से नापा जाये तो यह तीन इंच से कम चौड़ी नहीं रही होगी। मद की कस्तूरी जैसी गंध से सारा वातावरण व्याप्त हो गया था।

यह मस्ताना हाथी ऐसे भरे हुए बदन वाला था कि इसकी पीठ पर भी हड्डी नजर नहीं आती थी।

ये दिन संवेशन के थे, इसलिए भुण्ड के अन्य बलिष्ठ हाथियों को भी मैंने शिश्न बाहर लटका कर कामासक्त चलते देखा था।

डेढ़ बजे भुण्ड के अधिक सदस्य बिखर गये थे। वे नीचे पानी की ओर धीरे-धीरे बढ़ने लगे थे। इस भुरमुट में कुल आठ हथिनियाँ रह गयी थीं। इनके अलावा वे दो पट्टे भी थे जो सुबह लड़ रहे थे। कभी वे एक-दूसरे के नितम्बों पर अपने उद्दन्त चुभोते, कभी मुख से काटते और कभी लटकते हुए लिंग को सूण्ड के अग्रभाग से पकड़ते। जब एक पट्टा भागने लगता तो दूसरा उसकी पूँछ को पकड़ कर रोकने की कोशिश करता।

पौने दो बजे इन हाथियों ने भी इस भुरमुट को छोड़ दिया। सौ गज नीचे फिर भुण्ड के अधिक सदस्य इकट्ठा हो गये। कुछ हाथी नीचे पानी के स्रोत की ओर बढ़ गये थे।

बाईं तरफ पहाड़ी पर कुछ खतरा समझ कर सारा भुण्ड भाग खड़ा हुआ। सालवन से निकल कर ये बाहर खुले मैदान की ओर एक कतार में दौड़ रहे थे। उनके भारी पैर धरती पर ऐसे पड़ रहे थे मानो कई सौ दुरमुट मिट्टी को कूटने में एक साथ सक्रिय हो गये हों। पैरों के पटकने से उठती हुई सफेद धूल के गुब्बार आसमान में ऊँचे उठने लगे। कुछ देर के लिए भागते हुए हाथी इसमें अदृश्य हो गये। साल वन पर यह सफेद धूल ऐसे फैलती गई मानो वन की कालिमा का सफाया करके छोड़ेगी। खतरे की विगधाड़ों से घाटी गूँजने लगी।

भागते हुए संव्रस्त हाथी एक खुले मैदान में पहुँच गये थे। यहाँ वे किसी भी दिशा से आते हुए दुश्मन को भलि भाँति देख सकते थे और उसका मुकाबला कर सकते थे। भुण्ड की नेता हथिनी ने जोर से विगधाड़ कर उन्हें रुकने को कहा। गतिशील सशक्त टैंकों का यह गिरोह निश्चल खड़ा हो गया। धीरे-धीरे वे हल्हू के पेड़ के चारों ओर जमा हो गये जो चौड़ में अकेला खड़ा था। सबकी सूण्डें बाहर थीं। बच्चों को उन्होंने घेरे

के अन्दर कर लिया था। अब वे दुश्मन का मुकाबला करने के लिए बिलकुल तैयार थे। ऐसे शक्तिशाली व्यूह चक्र को देखकर कोई भी दुश्मन करमों पर आँख उठाने की जुरंत कैसे कर सकता था ?

खतरा टल जाने का निश्चय हो जाने पर वे फिर धीरे-धीरे भुण्ड से बिखरने लगे।

मेरा एक बन्दूकची प्यास से व्याकुल हो गया था और अब किसी भी तरह यहाँ रुकने को राजी नहीं हो रहा था। तीन बज चुके थे। पानी यहाँ से डेढ़ मील नीचे था। हाथियों को छोड़कर हमें पानी के लिए लौटना पड़ा। दिन भर हाथियों का पीछा करते रहने से बन्दूकची परेशान हो गया था। उसकी अन्यमनस्कता को देखकर हमने उसे छुट्टी दे दी और वह बन्दूक को लिये हुए कैम्प की ओर चल दिया।

जंगली हाथियों की आदतों का अध्ययन करने तथा उनके फोटो लेने के लिहाज से आज का दिन हमारे लिए बहुत अच्छा रहा था। हमें आशा थी कि उनके पीछे जाने से कुछ नये किस्म के फोटो मिल जायेंगे। पाँच बजे हम फिर लौट पड़े।

हमें अन्दाज नहीं था कि हाथी इतनी तेजी से पानी की ओर लौट रहे होंगे। कुल आधा मील जाने पर हमें शीशम चौड़ में भुण्ड मिल गया। एक दतैल तो रास्ते के बीचोंबीच खड़ा था। भुण्ड के आगे-आगे वह रास्ते के निरापद होने का संकेत बनकर चलता था। पहाड़ी के एक तरफ से तो हम चुपचाप ऊपर चढ़ रहे थे और दूसरी ओर से यह दतैल ऊपर आ रहा था। पहाड़ी की चोटी पर पहुँचकर ही हम एक-दूसरे को देख सकते थे। पहले हम ऊपर पहुँचे और हमने कुल पचास फीट की दूरी पर उसे अपनी ही दिशा में बढ़ते हुए देखा। हम मौत के कगार पर पहुँच गये थे।

लेकिन दोनों ही पक्ष एक-दूसरे से शंकित थे। सहज बुद्धि ने इधर हमें अपनी जान बचाकर टीलों पर भागने की प्रेरणा दी और उधर दतैल उल्टे पैर भाग खड़ा हुआ। उसे देखकर भुण्ड के बाकी हाथी चौंक गये।

कटी हुई एक ढांग से लटकती हुई शीशम की जड़ों के ऊपर हम बैठ गये। यहाँ से हम घाटी में फैले हुए हाथियों को अच्छी गौर कर सकते थे। दतैल द्वारा सावधान कर दिये जाने पर भुण्ड ने पानी की तरफ बढ़ने का इरादा स्थगित कर दिया था। वे फिर पेड़ की टहनियाँ खाने में लग गये। हमारी ढांग के नीचे कुछ हथनियाँ मिट्टी खोद रही थीं और उसमें से घास की जड़ें निकाल कर खा रही थीं। इनमें एक लाल कानों वाली घुई भी थी जिसका बच्चा भी पैर की ठोकर मारकर दूसरे हाथियों की तरह मिट्टी खोदने की कोशिश करता था। मिट्टी खोदने के लिए हाथी अगले पैर से आगे की तरफ ठोकर मारते हैं। फावले की तरह आगे से पीछे भी पैर चलाते हुए मिट्टी खोदते हैं।

कामासक्त दोनों पट्टे अब भी लड़ाई में लगे थे। एक बार तो एक ने भागते हुए दूसरे पट्टे की पूंछ को सूण्ड में पकड़ लिया।

बच्चे को सूखी मिट्टी में कुछ काम की चीज नहीं मिली तो माँ का दूध पीने में लग गया। सूण्ड को उसने ऊपर दुहरा मोड़ लिया और निचले होठ को भींचकर थनों को चूँघने लगा। दो मिनट बाद वह फिर बड़े हाथियों का अनुकरण करने में लग गया। काँस की टहनी को पकड़ कर तोड़ने की वह कोशिश करता था पर उसकी

नन्हें सी सूण्ड तोड़ नहीं पाती थी। इस झुण्ड में मिट्टी खोदकर जड़ों को खाने में सबसे अधिक व्यस्त इसकी माँ थी। मिट्टी रेतीली थी। पैर की ठोकर द्वारा आसानी से जड़ें निकल आती थी।

१९६७ के मई महीने में कई दिन लगातार मैं हाथियों के इस झुण्ड का नजदीकी से अध्ययन करता रहा। शक्तिशाली एक दूरबीन, तीन कैमरे और अपनी जंगल नोटबुक तथा पेन्सिल—यह सामान लेकर हम हाथियों से भरे पहाड़ी नालों व सोतों में हाथियों के पीछे-पीछे घूमते रहे। टीलों, ढलानों व गिरिवनों में लुक-छिपकर भागते फिरे और कहीं सुरक्षित आड़ में दुबके हुए घण्टों गुजारते रहे।

Pugmarks of Tiger: A Study in Movements

By

HARISH CHANDRA

Tiger by habit is a very moody animal. His actions are unpredictable, so are his movements. The impressions of his pugs that he leaves behind are in no way of fixed dimension or of constant likeness. They vary most of the time as he moves. His aim at that particular moment is his guiding factor in making his steps and strides.

He paces along with undulating legs, strides on cushioned pads and toes, the muscles ruffling on powerful fore-arms. He walks on his toes, which have huge claws, five in front and four in the rear, retracted by elastic ligaments within their fleshy sheaths. His head, jaws parted, sways from side to side, and is carried low, revealing the immense hump of wonderful muscle on nape and withers.

His long tail upturned at its tip and reaching below the hind legs swings idly to and fro as he glides with close fore and hind legs moving almost as one. His slouching and sauntering manner as he walks, lifting and putting down his forepaws with a peculiar 'roundarm' action and moving the hind legs inwards and setting the paws of his hind feet in the impressions of the forepaws seems to explain the single trail of identical impressions where they are found. It's also possible that his legs on one side of the body move simultaneously, or nearly so. It may, therefore, be confusing how the hind foot moves into the imprint of the fore foot when both feet move at the same time.

The marks of his four toes are regularly imprinted while the fifth of his forepaws are only occasionally seen. It seems that the tiger does not put parallel pressure on his fifth toe as he walks and the marks are usually indistinct. A tiger's hind legs lead in the track because his hind feet are longer than his fore feet, and he brings them further forward to ease the action of his walk.

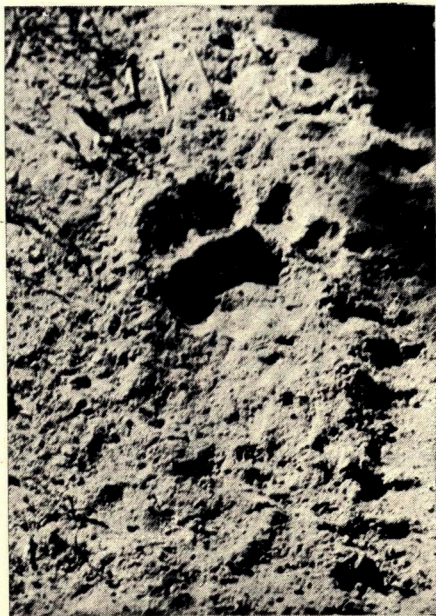
From the very early days of my shooting, I used to carry a tape, pencil and paper to note down measurements of their footprints wherever I found them. It was my hobby and I could ensure the sizes of these carnivoras when I shot some and compared their lengths with the measurements of their pugmarks. In a way that was also to show, through the pugmarks, the whereabouts of those particular tigers. However, some allowance has to be made for the varied surfaces of the ground where they tread. If the pugmarks have been made on reasonable ground, there is no reason that their noted size will not correspond with the size of the tiger, to very near his length, with a variation of about 2-3 inches only.

Sometime it does happen that the tiger proves to be much shorter in length than what should be expected from seeing his big pugmarks. In such cases it has been found that the particular tiger was far more bulky in body and had a shorter tail. His weight had pressed the ground heavily to make larger impressions of his pads. Also at times when a tigers' stomach is overloaded, he leaves larger pugs.

I began this research when my very old friend, the late Mr. M.D. Chaturvedi, I.F.S., retired Inspector General of Forests, Government of India, presented me with the proposition. In fact he induced me to find out 'how a tiger walked, whether he always placed his hind foot over the impression of his fore foot covering it fully, and was he to be called a bi-ped because of his leaving a single track?'. This delicate study in tigers' pugmarks got me fully interested, and sent me to the jungles more often. I only wished that he had suggested this to me much earlier, when he was posted in Pilibhit, and we could explore the issue together. As I write now, I have been greatly missing his guidance.

In the old days opportunities of all kinds were readily available. In the present circumstances it has been more often than not that my trips to the jungles have proved futile. There is far greater rush of traffic and people are on the forest roads and paths at any hour. Besides, the tigers have much declined, particularly their freedom of movement on open roads has practically gone. It has been hard to find continued long tracks of tigers when the pugmarks could be followed to some distance and more distinguishably. With the handicap of the tigers' own confusing steps, a lot of time, days, months and years, had to be spent and still much remains to be decided.

Once, when the open paths showed little of tigers' spoor I followed the pugmarks in dry nullahs. They are also called 'kharras' created by rain water from ages past. Their high ridges are thickly covered by bushes and growth of trees whose branches hang down over the nullahs. I picked up spoor in one and hesitatingly followed up. It became still more risky wherever the nullah narrowed and curved, bringing the drooping branches to cover it. I was hardly in a position to keep guard, concentrating on his spoor. Fortunately the tiger was not there in person and was not looting for me. His 'khauri', a place which he scrapes to ease himself, was there and it was so fresh that I thought the tiger was nearby.



Massive pugmark on raised dust
of Jeep Tyre.



Different coverings on soft ground.



Varying distance 'single-file' zigzag.



Covering one extreme right toe with slight
over-riding of pads.



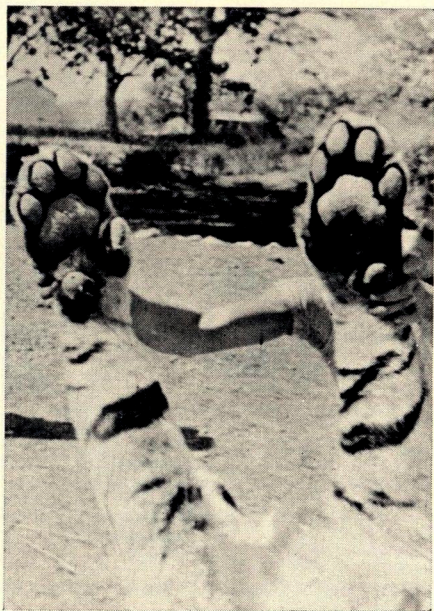
Soft sand climb-claws open.



Paw to paw gap of $(5.1/2)$ inches.



Varied covering.



Fore pugs of dead male tiger.

Then the spoor led me to a 'narkul' where also there was a thick grove and the soil was damp and swampy. In it the embedded pugmarks had depth. Joy overtook my strained mind when I saw those impressions, and caution dropped. While picturing and drawing them, I reached dangerously close to the 'narkul'. The reeds creaked. The same moment, something moved quickly from close, giving long rustling and breaking sounds of the reeds. I stopped dead. Then came sounds of splashes in water, and soon chital and 'gond' gave their shrieking alarms. The tiger had watched me for what I was doing with his pugmarks and when I got too near him, behaving like a gentleman, he decided meekly to retire.

Another time I tried to catch up with a tiger's big strides and pugmarks by spreading wood-ash on the loosely earthed surface of a canal-bank-road, where a pair was moving constantly. I spread the ash at three places, leaving sufficient gaps. The tigress passed consecutively for three nights, dexterously avoiding her steps on the ash-spread surfaces and crossed by its edges, following the clear ground. On the fourth day, however, I found that she had trodden, though sparingly, on the ash making no deep impressions of her paws distinct enough for pictures. The tiny grass had appeared over the ash and it had lost much of its original lustre by then. However, I have seen tigers walk freely over the all-burnt areas in the terai where they do not feel so much different of colour and as the tracts are large so that they cannot be avoided.

TIGER MOODS

Sometimes he moves slow, or is on the look-out for game, or is just having a stroll. As other times, he may be hurrying his steps when chasing something, or is scared of something. It is due to these slow and speedy movements that the pug impressions that he leaves behind have infinite variations.

They bring their claws out from the sheathes and make pointed holes or scratches within the marks of the toes when they have to make an abrupt start, almost going for a leap, or dash forward on the firing of a gun, missed or hit, or on any sudden intrusion or provocation turning them angry or frightened. When a tiger rushes forward after getting wounded, dragging his body on all-fours, he pulls his heavy body along with all the claws out, making digs and scratches on the surface. At places the 'rub' mark of his belly while in a rush forward or when he rests, pressing his belly because of a stomach wound, is also seen and its deep mark is found as is evident from the Plate No. 13 along with the claws opened out. Elongated claw marks of the rear paws while forcing a dash, and deeply embedded impressions of his fore paws on pressing a strong-hold are also seen in the field clearly.

A man-eater has a different story to tell. He avoids leaving behind his pugmarks by making leaps over the open paths and cleverly keeps to hard ground which makes a compa-

rison between normal and abnormal tigers difficult. He obviously does not wish to leave a back-trail for a hunter to follow.

A tiger does not, by habit, walks on one side of the road for an indefinite distance. He changes the sides at intervals. Then the pugmarks of the same tiger have been seen on the other side of the same road on his return journey. His two-way trips are on two different sides of a road by habit.

It's generally not a mood, but the demanding calls of old age in which tigers' pugs are splayed out, cracked, and creased. Their impressions are found somewhat erased towards the toes and the pad marks have thin lines. Sometime an imprint gives the impression of a drag which usually is made by one with some kind of injury.

Big tigers' pugs show greater depth of marks than average young tigers. The forepug mark of a grown-up male is more massive and square toed than that of a tigress of that age. The foremarks are larger, broader, heavier and rounder than the hindmarks, so much so, in some cases, that the difference suggests that the tracks have been made by two tigers. The pugmarks of a tigress show much less divergence between fore and hind sizes and shapes. The impression of her second-from-left foretoe falls longer as much as upto $1\frac{1}{2}$ inches, from the rest of the toes. The nearest toe to its right, the 3rd toe, however, gives less difference than the others. The fourth toe is like the first toe. The difference is apt to vary according to the size of an animal and in which direction presses on the ground. Incidentally, because of this elongated marking, distinction between a male and female tiger is easy, provided the pugmarks have been clearly impressed. However, shapes and figures vary in animals, too, as they do in human-beings.

A cub, if having disproportionately large paws, may leave behind very large pugmarks, but their imprints are shallow as compared to those made by an adult.

PUG MARKS

When they walk carelessly, and are not actually hunting, they seem to leave a double spoor which deceives, looking like two animals going parallel to each other. Both the tracks differ in size. If, in a case like this, a tigress has moved along with her cub, then both spoor have maintained a 'single-file', separately and distinctly.

When they walk prowling in search of game or stalking, the imprints of their rear paws have been found falling all over the marks made by their fore paws. It is only fair to conclude that the hind paw falls fully on the impression of the fore paw, not regularly, but with the circumstances. Although formation of a one-line track is predominant, the covering one over the other is not always whole and it is never in a straight line. When leaving only a



Striding over tyre lines.



Claws and pugs marking while climbing on sandy bank



Living tiger in pose.



Big male's pugs on tyres of Jeep



1. Double spoor symmetrically parallel. 2. Back edge of the pad of the leading hind foot just touching the tip line of the fore toes. 3. All toes fully covered including the joint line of the pad. 4. All toes covered $\frac{3}{4}$ th. 5. Three toes of one and four of the other pugmarks half covered, 5th toe is visible in one impression. 6. $\frac{3}{4}$ th of the pad only is covered. 7. Single-file zigzag track. 8. Double spoor march—can be mistaken for tigress and cub as single-file. 9. Impression of paw in an attack on live bait-claw open for leap.

single spoor one will also find separate imprints of the hind paws where he has turned to left or right, or where he has stopped to listen. Normally I have seen, when a tiger walks relaxed along a cart track or a stream bed, he leaves a double spoor with his hind paws imprinted two, three, four or more inches away in front of those made by the fore paws.

However, in a majority of cases an impression of the hind foot does not cover the impression of the fore foot entirely. Hind foot does fall in front of the fore foot in a normal walk, but the impressions vary in their gaps and distances.

Some hind paws just fall touching the joint of the toes, covering only the pad of the fore paw in full. At other time they cover $\frac{3}{4}$ th of the pad, half or $\frac{1}{3}$ rd. Some cover the toes in parts of $\frac{1}{6}$ th, $\frac{1}{4}$ th, more than $\frac{1}{4}$ th, half $\frac{3}{4}$ th, the entire toes, and at times with a part of the pad. Some fall just touching the farthest end of the impressions of the fore toes, or leave gaps of a fraction of an inch, or a little more, and even upto $\frac{3}{4}$ th to $1\frac{1}{2}$ or more inches.

The distance between strides varies, too, with their changing directions. Some strides leave gaps varying from 16 inches to 28 inches or more. Other times they differ between $5\frac{1}{2}$ inches to 14 inches according to pace and purpose.

Sometime the extreme left one fore toe or two toes are fully covered and at other times the extreme right one or two toes are covered on a similar pattern alternately. Occasionally three fore toes of the right and left are covered and at each stride its pattern is alternately symmetrical. Various photographs of their pugmarks show a lot about their movements.

A large majority of pugmarks that I have found either entirely show all the toes left open, i.e., the back edge of the pad of the leading hind foot just touching the tip line of the fore toes, or entirely covering all the toes with the joint-line of the fore-foot pad. The impressions are also found where the two rear and front foot-pads touch each other parallel, or curved, and also cut each other in various proportions.

I have not seen panthers doing so many variations in their pug impressions as tigers do. A panther and pantheress can maintain 'single file' double spoor when going together on a clear path.

May be, other hunters having greater experience and having got better opportunities to study this problem, might have a different story to tell.

As has been said, the tiger retains an eccentric mastery of his movement and his pugmarks.

The White Tigers

By

K.S. SANKHALA

The white tiger (*Panthera tigris*) is a magnificent snow-white beast with distinct or light black or ash coloured stripes, owing to the admixture of white hair. The nose is mottled-grey-pink instead of normal pink. The lips are grey black on the hair line, in place of normal black and merge quickly instead of gradually into the pink of the interior mouth. The colouring of the eyes is very distinct. There is no well-defined division between yellow of the comix and blue of the iris. In some light they appear colourless. The pads of their feet are pink.

An albino or a mutant ! There are different opinions. Some held the view that it was an albino or at least partial-albino, but the recent study of the pedigree and genetical analysis has proved that it is a mutant.

Of the known population of 34 living white tigers in the world, 26 are in India. One pair 'Champa' and 'Chameli' and four cubs are at Bristol Zoo, one tigress 'Mohini' at the National Zoological Park, Washington, D.C. and one tiger is in Miami Zoo. Almost all the tigers and tigresses have been given names and up-to-date pedigree records are being maintained. The names given are Indian and to facilitate easy identification of sex, name of male is mentioned first. Of the 26 white tigers at home, two males 'Niladari', and 'Himadari', one female 'Chandni' and four newly born cubs are at Alipore Zoological Garden, Calcutta. Three pairs and one seven-month-old female cub are at Rewa with His Highness Rewa, and 11 are at Delhi Zoological Park.

There is an International White Tiger Club, the membership of which is restricted to those who either own or manage white tigers. The club helps to co-ordinate the breeding programme of the tigers.

Our collection ranges from the oldest patriarch 'Mohan' housed in the abandoned palaces of the Maharaja of Rewa at Govindgarh, to two cubs (one white and one coloured) born on the 8th June, 1969 at Delhi Zoological Park.

Earliest authentic reports of shooting of a white tiger date back to 1907 and since then more than 20 specimens have been shot in the forests of Assam, Orissa and Madhya Pradesh. The last record of shooting of a white tiger is from Bihar in 1958. But the history of the living race of the white tigers starts with the shoot of 23rd May, 1951 conducted by the

Maharaja of Rewa. During this shoot, one of the four tiger cubs beaten out of Rewa forests was observed to be white. It was trapped and reared as 'Mohan' at Govindgarh Palace.

When 'Mohan' attained maturity, a tigress 'Begum' caught from the forests of Rewa was introduced as his mate. Begum produced her first litter on the 7th September, 1953 but both the cubs were coloured. She also did not produce any white cub in her second litter of April, 1955. There was no hope of having a white offspring from this pair and, therefore, another attempt was made in 1958 by substituting 'Radha' the normal coloured tigress from the second litter of Begum. By now Radha was four years old. October 30, 1958 announced the success of the experiment and all the four cubs—'Raja', 'Rani', 'Sukeshi' and 'Mohini' born to Radha were white. All the cubs were brought up by the mother tigress without any casualty. Raja, the only male of the litter, with Rani are in Delhi, Sukeshi the tigress is still at Govindgarh serving as a mate for Mohan, and Mohini the tigress is in Washington.

Radha gave birth to Malini, a normal coloured female and two males 'Niladari' and 'Himadari' in 1960. This entire lot was purchased by the Alipore Zoological Garden, Calcutta for Rs. 94,000.00. 'Niladari' and 'Malini' produced a white cub in 1965. The pair again produced one cub in 1967 which could not survive. In their third litter of September, 1967, the pair produced two normal coloured cubs, one male and one female. The male of course was still-born. In May, 1969 the pair has produced four cubs—all white. In 1962, the pair at Govindgarh (Mohan × Radha) produced two white cubs—'Champi' the male and 'Chameli' the female, both now the property of Bristol Zoo, London. This pair has produced two litters. In their first litter one female white cub was born but it did not survive. Their second litter of May, 1968 of four white cubs is growing successfully.

Sukeshi gave birth to two cubs on the 17th July, 1963. Both the cubs died after three days. In her second litter of 22nd November, 1964, a male and a female white cubs were born. Her third litter was on 26th March, 1966 when two white cubs—one male and one female were born. On 6th September, 1967, she delivered two female white cubs. Her fifth litter on 17th November, 1968 was of one male and one female white cubs, the female was of course still born.

At Washington, Mohini mated with a normal coloured tiger 'Sampson' from the second litter of Mohan and Begum and produced two litters—one in January, 1964 when three cubs (one white and two normal coloured) were born, but only 'Ramana' the normal coloured male survived. The other litter was produced on the 5th February, 1968 when two cubs were born. Attempts are being made to mate this normal coloured tiger 'Ramana' with 'Mohini'.

The story of the pair 'Raja' and 'Rani' of Delhi Zoo is interesting. Rani gave birth to two white cubs—one male and one female in May, 1964 soon after her arrival in Delhi. But

she mauled both the cubs with the result that the female cub died after two days and the male cub 'Tippu' or 'Krishna', the tailless tiger, who is otherwise a handsome beast, was hand-reared with difficulty.

Rani again produced two white cubs in September, 1965 but she did not care for the cubs and the cubs died. In December, 1965, she gave birth to three white cubs. This time she was very affectionate towards her cubs. All the three cubs grew up well but 'Rajkumari' the tigress from this litter died at the age of $17\frac{1}{2}$ months and 'Ravi' died at Kanpur Railway station on 17th April, 1967 while being shipped to U.S.A. Rani produced her fourth litter of four cubs in September, 1967 out of which one was still-born. Her fifth litter of three cubs—all males, was in May, 1968. All are living. They have been weaned and the tigress is again with Raja.

Radha the tigress when she came to Delhi was carrying. She produced three cubs out of which one was white. The white cub died at the age of 21 months. She produced five cubs in July, 1967 but all the cubs died partly by her neglectful habit and partly due to outbreak of gastro-enteritis amongst cats in Delhi Zoo in 1967. She produced her sixth litter of four cubs—two whites and two coloured, in June, 1969. One of each colour died due to her neglect. The two were saved by partial hand-rearing.

The white characteristic is due to a recessive gene and can be explained as follows:—

Tiger is a diploid animal producing haploid gametes as in other cats. Suppose genes responsible for white colour is determined by a single autosomal recessive gene say w , its dominant allele determining the normal colouring of eyes, coat, nose and pads would thus be designated W . According to this hypothesis, all white tigers must be of the genotype ww and normal coloured tigers WW or Ww .

The crosses between two yellow tigers can yield either yellow cubs and white cubs in the theoretical ratio of 3:1 when both parents are heterozygous. Crosses between two white tigers can yield only white tigers whereas crosses between a white and a coloured tiger can yield two types of progeny depending on the genotype of the yellow parents. If the yellow parents are WW , then all the progeny may consist of both yellow cubs and white cubs and when more offsprings are produced greater will be the chances of the ratio of yellow to white cubs to approach 1:1. It also follows that the yellow tiger out of white parents must be of the genotype Ww .

Our records indicate that the white tigers including the coloured with white genes are bigger in size, shoulder height, body length, skull, circumference and body girth than normal coloured tigers.

<i>White Tigers</i>		<i>Normal Coloured Tigers</i>
Average length	0.53 metres	0.50 metres
Av. Shoulder height	0.17 „	0.125 „
Av. weight	1.37 Kg.	1.25 Kg.

Dimensions of grown-up members of white race show difference in size even. At two years 'Dalip' and 'Krishna' (whites) weighed 139 and 144 kilograms as compared to the same age normal coloured tigers 'Ram' and 'Jim' 106 and 119 kilograms. 'Raja' (white) at the age of 10 years was 100 centimeters at shoulder height whereas 'Suraj' a normal coloured tiger at the age of 12 years was 90 centimeters. Even 'Ratna' (87 cms) and 'Vindhya' (88 cms) normal coloured tigresses from the white race are higher than the normal coloured tigress 'Ashrafi' (82 cms).

The white tiger is the contribution of His Highness Maharaja Shri Marthend Singh of Rewa. The patience with which this expensive breeding programme was conceived and pursued is really creditable. This mutant is now established and by selective breeding, we will continue to have white tigers.

Acknowledgements

I express my grateful thanks to Shri R.C. Soni, Inspector-General of Forests, Government of India, His Highness the Maharaja of Rewa for all the help given in preparation of this paper. I am also thankful to Dr. Theodore H. Reed, Director, National Zoological Park, Washington, D.C., Dr. R.E. Greed, Director, Bristol Zoo, and Shri R.K. Lahiri, Director, Alipore Zoological Garden, Calcutta for giving valuable help.

References

1. Gee, E.P. (1964a)—The Wild Life of India: Collins.
2. Gee, E.P. (1964b)—The White tigers. *Animals* 3 (11): 282-286.
3. Oswald, A. (1960)—The white tigers of Rewa. *The Cheetal*. Vol. 2 No. 2: 63-67.
4. Roth, W.T. (1964)—The rare white tigers of Rewa. *J. Cat Genet.* 1 (3): 18-19.
5. Searle, A.G. (1959)—A study of variation in Singapore cats. *J. Genet.* 56: 1-16.
6. Thornton, Ian W.B. Young, K.K. and Sankhala, K.S. (1967)—The genetics of the white tigers of Rewa. *J. Zool., Lond.* (1967) 152, 127-135.

Some Observations on the Feeding Habits and Predators of Peafowl in Saurashtra

By

R.S. DHARMAKUMARSINHJI

There have been allegations that peafowl destroy Red Junglefowl eggs and that peafowl aggressively keep junglefowl away from drinking at water holes in forest areas. I do not wish to comment on this matter.

The peafowl in Saurashtra has always been venerated as a sacred bird and largely, if not solely, on account of this, the bird has not suffered serious harm except in some isolated areas. Safeguarded in the past by princes and peasants alike, and now being proclaimed the National Bird, the peafowl has enjoyed full protection. Hence its abundance in Saurashtra to the extent that it almost appears as a feral species.

After consulting innumerable farmers and watching the peafowl over many years even in my own farms, I have come to the conclusion that in farmland, the peafowl is a great nuisance as it feeds largely upon the tender shoots, buds, flowers of vegetable crops and to some extent on standing grain crops such as wheat, barley, oats and rice and is therefore mostly vegetarian in its diet. Peafowl depredation can be quite serious to a farmer planting leguminous crops, though it will pick off the heads of lucerne, onions and oven chillies. The farmer knows this and is aware that the peafowl (when in groups) is a pest, and therefore takes special care to drive it away. The peafowl owing to its long, extensible neck can reach highgrowing plants which smaller game birds cannot reach. Thus, crops mentioned earlier suffer, resulting in retarded growth. Peafowl, however, are easily driven away from fields but like the sacred monkey know when to steal. The normal feeding times of peafowl are early morning and evening, and when the farmer is off-guard. It is when crops are growing at an early stage that peafowl do most damage, but once ripened they are usually safe except in some recurring crops and while in flower, i.e., lucerne, etc. When driven away from crops, the birds merely remain on the periphery of the farm and no sooner has the farmer left, than the birds return. Rarely, however, is there devastation to crops, unless the farmer completely ignores peafowl invading them. Peafowl, when constantly kept away, turn to feeding on marginal grasses and will even seek other food. Peafowl may then feed on insects, fallen grain, seeds or fruits or berries and worms, spiders, centipedes and the like. Although known to devour snakes, I have never seen peafowl attacking or eating snakes, though some farmers say they do so. It is unlikely they attack large snakes.

In forest areas such as the Gir, peafowl thrive on insects and low forest vegetation and its tender shoots, buds, leaves, flowers, and fruit, though grasses are its favourite. Yet,

peafowl are often seen hanging around in the vicinity of forest villages and in the fields in the midst of forest and its borders. When driven from fields the birds seek shelter in the forest. In forest land the birds have more varied food and are, of course, more active owing to the threat from predators. I have seen peafowl rummaging for food amongst fallen leaves much like hens, but they do not use their feet to that extent.

I have not killed peafowl for stomach-content analysis, but I have watched them feeding for hours at all times of the day, which they will do except at the hottest hours during the hot season. I can therefore only generalise as to their food in the following manner.

Farmland		<i>Food (including grasses, etc.)</i>
Summer Season/March to June	A	Vegetable matter (mostly green) 50%
	B	Insect and animal food 20%
	C	Fallen fruit, seeds and grain 30%
Winter Season/November to February	A	Vegetable matter (mostly green) 50%
	B	Insect and animal food 10%
	C	Fallen fruit, seeds and grain 40%
Rainy Season/ July to October	A	Vegetable matter (mostly green) 50%
	B	Insect and animal food 40%
	C	Fallen fruit, seeds and grain 10%

At the time when harvesting is over and when grain is collected in heaps in the farm (*Khalas*) and threshed, peafowl will gather and pilfer food and eat left-over grain with other wildlife. Here again the farmer sees that his food grain is not unduly stolen. The vegetarian farmer of Saurashtra tolerates the peafowl much more so than his meat-eating brethren.

Predators and Elements that Check Peafowl Increase

1. Man, in areas where peafowl is not a sacred bird. The eggs are eaten regularly by local nomads.
2. Jungle Cat, Wolf, Leopard, Crested Hawk-Eagle, Crested Serpent Eagle, Bonelli's Eagle, Tawny Eagle, Steppe Eagle, Booted Eagle, Imperial Eagle, all prey on peafowl and their young, but not all eagles do so on adult birds.
3. The Mongoose will suck the eggs and will attack a peahen brooding. Likewise, Monitor lizards and large snakes. A crow will take away or eat eggs if the eggs are found unprotected.
4. Jackals may occasionally hunt peafowl chicks but I have not seen jackals having caught peafowl nor heard of such reports.
5. Drought and deficient rainfall drastically check peafowl increase as food and nesting cover is inadequate.

In the Gir forest, the leopard preys much upon peafowl, at dawn and dusk, and at night and the Jungle Cat sometimes. Some large Owls may also prey on young peafowl but I have no evidence. The Indian Crested Hawk Eagle and Bonelli's Eagle prey regularly on young and sub-adult peafowl.

In conclusion, I may say that the food pattern of peafowl depends upon what is grown in various farms at different times of the year in different parts of the country. I would like to say that the peafowl when kept away from growing crops is not a destructive bird as it subsists upon wild vegetation, insect and animal-food. As peafowl breed in their third or fourth year, the breeding cycle does not allow the birds to increase as rapidly as smaller game birds. Moreover, young peafowl are preyed upon by predators frequently, and peafowl increase checked by man and adverse rainfall. It is, however, a hardy bird and I have not heard of wholesale destruction owing to disease. It is, however, remarkable that the bird can fend for itself against cats, and eagles in farmland and it is rarely found killed by such predators. Birds roost on topmost branches of trees or high structures for their own safety. What effect insecticides have on their breeding is another unknown factor.

Falconry

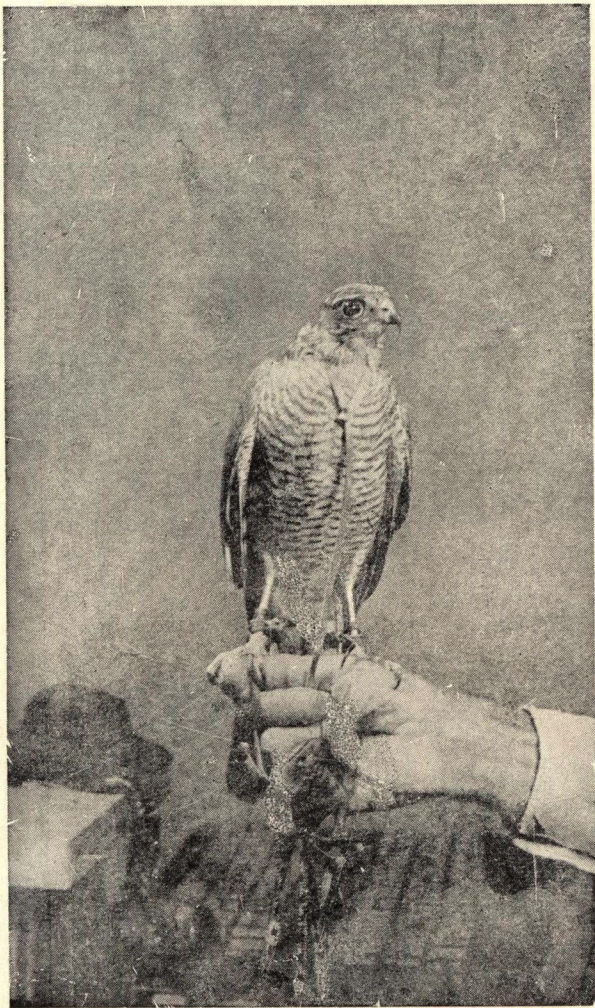
By

S.M. OSMAN

Falconry is the art of training and employing birds of prey for hunting and for sport. In the beginning it was just a means of providing man his daily food. At one time it was considered the sport of the upper class. As an unparalleled pastime, it could woo Diogenes from his tub, and draw Stylites rushing from his pillar. Even today, regarding its excellence, there is no dissentient murmur from the true Pundits of sportdom, though it demands from its devotees, great skill, abundant endurance, and lots of patience.

Some 3,000 years ago it started in Central Asia, and ever since has continued to grow and spread over many countries of the world.

Of all the hard-bitten group of sportsmen, falconers are the star hunters. Hunting with a falcon is far more exciting and fascinating than hunting with a gun or even shooting with a camera. In order to understand the significance of this statement, we have in the first place to conceive the idea of how difficult it can be to get these wild dangerous, and almost untameable birds to co-operate and to obey our commands. At times, abortive attempts at



A freak of nature the only sparrowhawk in the world (on record) to be having black eyes.



Two years old sparrowhawk side view.



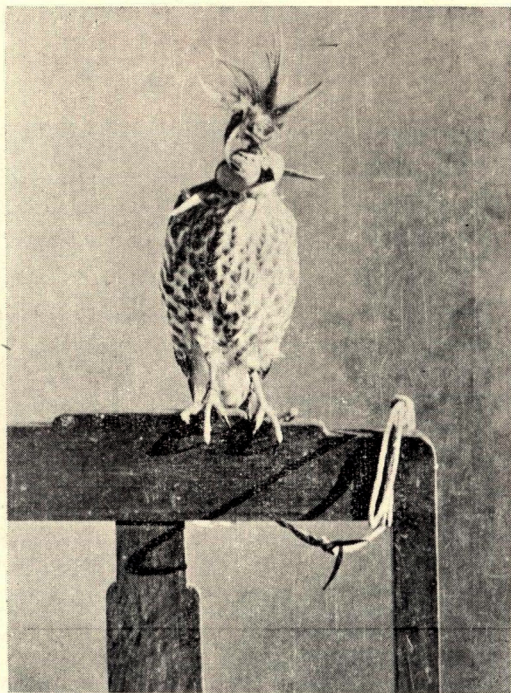
Falco Cherrug Cherrug Male



Hodgson's Hawk-eagle
Spizaetus nipalensis



Falco Lagger female



"Shikra Sparrowhawk" hooded
Accipiter badius

training these birds may spell discouragement and despondency to the aspirant falconer but, perseverance will soon reveal a reward beyond the pale of ordinary Nimrods. In the words of Freeman and Salvin, falconry "boasts a long line of ancestors, and has claimed and received homage from the chivalry and beauty of many centuries."

There are some who will want to cast a shadow of cruelty on this noble sport. Criticism of this great pastime can be brought forward by the ignorant only. Any dispassionate survey will confirm that in no other sport throughout the world, are the participants so evenly matched. By nature, wildlife, including birds, is well able to take care of itself. It is by no means an uncommon occurrence to watch the quarry, in the practice of falconry, outfly its pursuer. Here it is not the number of kills that really matter but, the style and skill with which a single kill is made is of importance. Besides, in falconry, the question of game getting away wounded, perhaps to die in agony, simply does not arise. It either is killed outright, or else, escapes unscathed. Also right upto the very end, the quarry has an even chance to trick its pursuer and get away safely. But, "Not to love hawking" in the words of Freeman and Salvin, "is proof of the grossest vulgarity of disposition, and of many drops of churlish blood."

Many different species of birds of prey are made use of in falconry. The three main types and orders of birds that take precedence over the others are principally known by the colour of their eyes, character of their beaks, formation of their wing feathers, and their scaly and feathered legs respectively. We first consider the Order Falconiformes (=Accipitres). Before devoting attention to any individual in this order, it is better to view species in general. These birds are known as the "short winged Hawks" and have yellow iris. They have broad wings with rounded tips and their tails are long. The fourth primary feather in the wing is always the longest and their beaks are slenderly formed. When compared to the true falcons we find that Hawks have proportionately longer tarsii. Hawks can successfully hunt in wooded country and most of the time this is accomplished by stealthily approaching and surprising the victim. They kill by the pressure of their powerful feet, driving their sharp talons into the body of the unfortunate prey. As a hawk grows older, the yellow of its eyes changes to a deep orange and in very old birds it has been noticed to be a deep red.

Of the same order next in the family Falconidae come the falcons pertaining to the Falconinae subfamily. In the genus "*Falco*", the second primary feather of the wing is the longest whereas the first and the third are of equal length. These birds have very dark brown iris in their eyes. It is for this reason that in Persian they have been dubbed "Siah—Chashams" meaning dark eyed. When in flight their extremely sharp pointed wings give them away easily and even a novice at the game can always tell them from the "*Accipiters*" with their rounded wings and broad secondaries. When compared to the hawks we see that falcons

have shorter but more powerful beaks, broader at the base and with a notch in the upper mandible. Falcons are some of the fastest birds on earth and nature has in consequence, provided them with a complicated nostril structure that makes respiration comparatively easy while travelling at speed. Another point noticeable in falcons is the mustachial stripe just under the eyes. By this simple means light gets mostly absorbed and glare and a scattering of rays close to the eye is greatly reduced. Generally speaking all falcons, it will be observed, are very robustly built, appearing to be squat and broad-shouldered. A falcon depends on its speed to fly down its quarry, always whooping from great heights to effect a kill. As in the case of all other birds of prey, the male is about one third less in size than the female.

We now come to the overlord of the family Falconidae. Of the Aquilinae subfamily, the eagles fall under the *Aquila* group of birds. Here also, as in the case of the *Accipiters* the wings are rounded but of course much larger and more powerfully built. The fourth primary feather, as in the case of hawks, is the longest. The feet of this genus "*Aquila*" are feathered down to the toes. They are the most powerful birds of prey on the face of our planet, and their training is not an easy undertaking. They are extremely ferocious and, even when fully trained, have got to be watched closely all the time. There are many subspecies in this subfamily Aquilinae and each kind employs a different method of hunting. On the whole however, the way game is depatched is nearly the same. When an eagle wishes to drive its claws into its prey, to kill it, he perches on top of it and sinks down with the weight of his body thereby shortening the great tendon and thus forcibly pressing the claws together.

The aspiring falconer's decision regarding the type of hawk or falcon he proposes to keep has been a much debated question. The choice, broadly speaking, will depend upon a number of factors. In the first place one has got to know the sort of country one will be having access to and the kind of quarry available therein. Also the time a person is able to spare in training and manning his birds. Falcons mostly inhabit wide open country and are best in flat and arid terrain where any quarry will have to fly long distances before gaining shelter in the next lot of bushes. On the other hand, in places where there are trees and bushes growing at short intervals the *Accipiters* are in their element, and in such conditions only a bird capable of short determined dashes is useful. In the case of *Accipiters* as well as "*Falcows*" a wide range of birds, capable of hunting heavy and light game, is to be found. However, at no time, must one expect a small hawk or falcon, to do the work of the larger ones, or the heavier birds to have the dash and manoeuvrability of the smaller predators.

After having discovered the hawk best suited for his purpose, the falconer will have to catch his bird by his own efforts as this will give him greater satisfaction than obtaining a falcon from a dealer or a pet shop. One method would be to find an eyrie and at the right

time to collect the eyass. This way he runs the risk of falling off a rockface or a tree, depending upon the location of the nest. Every year, in many parts of the world, hawks and falcons are collected this way so, provided our hero (falconer) does not mind surmounting such difficult obstacles, the method could be given a try, though it would be a good idea to get one's self heavily insured before embarking on any such a venture.

The "Doogaza" is an old Persian method for trapping birds of prey. The net used is nearly five and a half feet high and is supported by two vertical poles driven into the ground at about seven feet from each other. The bait, usually a live bird, is tied behind this net which faces broadside, the falcon perched on top of some tree. The falcon gets attracted by the movement of the bait and as it flies down to grab it, it gets caught in the meshes of the net.

Famous Dutch hawk trappers have always been very fond of the bow net. Each year, in Holland, many falcons would be caught by it. There is nothing very extraordinary about the bow net, besides its use is not simply confined to the capture of hawks alone, but when used by the Dutch masters, its method of application is somewhat different. This is made from two semicircular hoops of wood, though metal can also be used, hinged together at the ends and covered with a net very baggy in the middle. One hoop is secured to the ground with pegs and, the other is tied to a strong cord and folded back on to its counterpart anchored in the ground. As the cord is pulled it causes the net to fly up and thereby cover the object that lies within its confines. When this trap is set to receive a falcon, the process is further made elaborate with the inclusion of an observation post in the form of a hut, where the trapper stations himself with a scanning device, no other than a grey shrike, which will by its shrill vociferation give warning of the approach of any falcon within sight. At the sound of this signal, the man in the hut, tugs at a line the other end of which is tied to a pole some ten feet high and planted close to some natural cover such as thick bushes. The line becomes taut and draws out a pigeon that uptill now had remained concealed in a special box fitted at the foot of the pole. As the pigeon is held by the main line now drawn by the trapper, it flutters helplessly around it at some eight feet from the ground. This display of helplessness, naturally attracts the falcon that looks upon it as easy prey and immediately flies to it. The trapper watches through a peephole, in the wall of the hide, and as the falcon stoops to kill, he slackens the line that had so cunningly exposed the pigeon which at once falls back to the foot of the pole and takes cover in the shelter of the bushes mentioned earlier. At the same time the trapper pulls yet at a second line which brings to light another pigeon that is set in a trap or bownet. This the falcon attacks and when it binds with it the bownet is sprung by the falconer.

Arabs use a net very similar to the "Doogaza" of the Persians. It is slightly smaller and when properly set remains inclined at an angle of about forty degrees. In this case, only

the two top corners are attached to the poles while the bottom corners are anchored to pins driven into the ground. This way the net is held stretched to maximum capacity and, when it is hit by the falcon that flies to the bait secured under the inclined net, the net buckles and falls inwards no matter which side of it is struck.

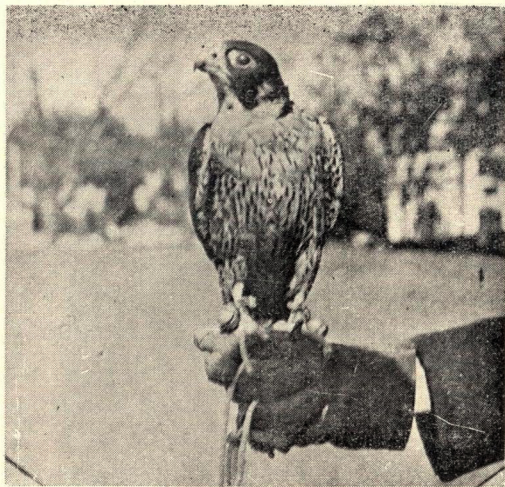
In the Himalayas, the villagers suspend, between the branches of trees, baggy nets that are usually over fifteen metres in length and some three metres in width. These nets cover likely places, on ridges mainly, where hawks generally are in the habit of flying over. And as the bottom portion of every net is always folded back to a depth of about three feet, any bird that hits the net at the time of crossing over the ridge, falls in the cavity and is held captive till the trapper arrives. But netting is not the only way to capture wild hawks.

The introduction of "Nooses" has contributed a great deal in the capture of hawks and falcons all over the world. Indian "Padam" consisting of nine or twelve large nooses, twisted from gut, and secured to pegs are held in series by a stout cord running from one peg to another planted vertically into the ground in a circular formation. The bait or live pigeon is set in the centre of this circle of nooses and as the falcon flies over them, intent on securing an easy prey, gets snared by one of the nooses or "Padam", as they are usually called. This method was at one time very much in practice in Northern India especially in the Punjab, but I feel it could lead to an accident and the falcon may get permanently injured as a result of being hooked in the neck while swooping at great speed.

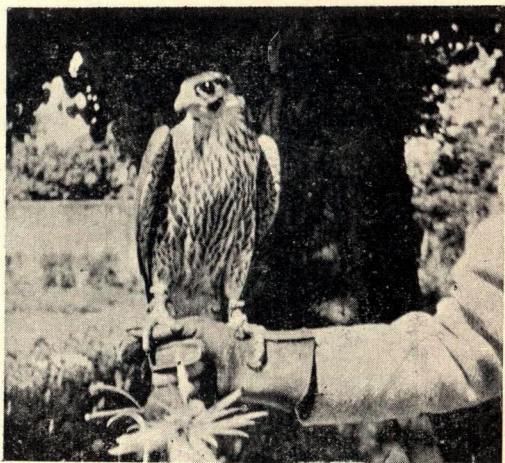
"Barak" is yet another old Persian method exploiting the use of the noose. In this case a cloth ball is dyed red and decorated with a number of nooses. Two ribbons a few inches in length are left to trail behind and the whole contraption is secured to the Tarsii of a kite. This unfortunate bird has its eyelids partially sealed so that it can only see up and not downwards. In likely places and at the proper time, the loaded kite is released. It will immediately begin to soar. Any falcon within the radius of one and a half miles will see it and the contraption tied to its feet which it takes to be some dead bird. In an effort to rob the kite of its valuable cargo, the piratical falcon attacks it and in the fight that ensues gets one of its toes caught by the noose tied to the cloth ball. When this happens, very naturally both come tumbling down to the ground. The falconer then rushes forward to grab his prize. One big snag in this approach to trapping a hawk is that an eagle may intervene and before the falconer has been able to lay hands on the falcon, it may carry both kite and falcon away, or kill them.

Nooses are made use of in one more method which calls for a cage like structure, studded with a score of them and, holding a number of live sparrows. Generally hawks are lured to captivity and in India the method is popularly known as the "Bal Chutterie".

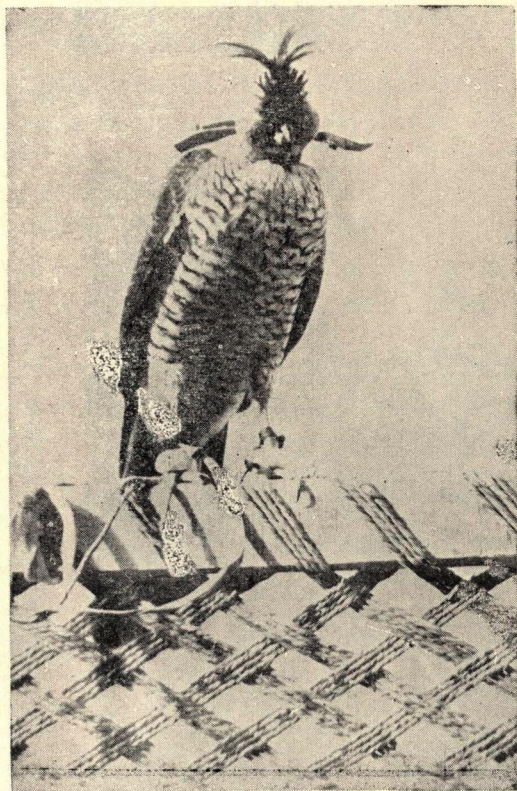
In the Province of Herat in Afghanistan, I once had the opportunity to witness a very novel way of catching sparrowhawks. It was, I remember, in winter and during the month of



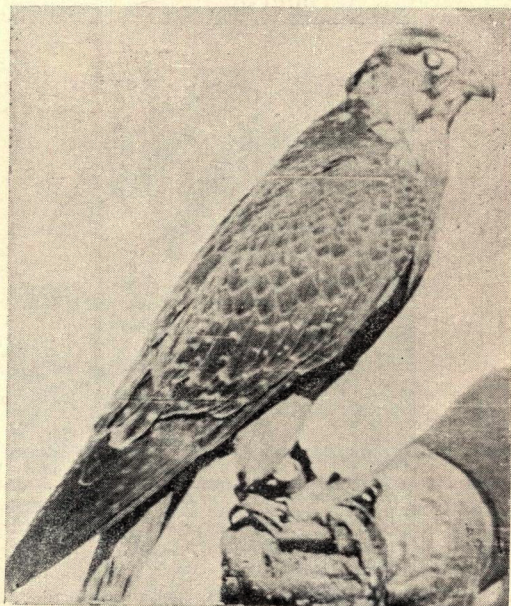
Shahin Falcon *Peregrinus Perogrinator*
(Sultan Falcon)



Perigrine Falcon Female one year old



An immature sparrowhawk. See markings
on crop and refer to literature.



Shahin Falcon *Falco bybalonicus*
Red Naped—Shahin



Falco Biarmicus Lanner Falcon



Self with two sparrowhawks Juno and Juliet



Eagle after hare

December, when a few energetic Afghan falconers at midnight sallied forth to a grove. Here these sporting characters had marked previously, a sparrowhawk roosting in a particular tree. At some distance from this tree the party came to a halt and fixed a noose at the end of a long thin pole. A candle was then secured to the pole a few feet below the noose. This pole with a noose at one end and a candle lighted and secured a few feet below it, could as in the case of a fishing rod, be extended to any given length by coupling auxiliary poles to it. With this device ready and the length of the pole set according to previous calculations, one person who knew the exact location of the hawk roosting up in the tree, moved forward. When directly under the hawk he gradually raised the pole and by the light of the candle was able to direct it towards the unsuspecting bird. I was able to see that the hawk had woken up by now and, was intently watching the approach of the candle snaking its way towards it. Very cautiously the noose was slipped over the hawk's head and with a gentle jerk it was snared true and proper. In the commotion that followed the candle was quenched and in this state of darkness was the falconer able to recover his coveted prize. This certainly is not a method that may be greatly recommended as it involves the study of a hawk's roosting habits as well as wastage of considerable time. Besides, the exercise of great skill and practise in slipping the noose over a wild hawk's head is necessary for its successful conclusion.

There are some more ways of catching a hawk. In Stalif, the Kohistani Afghans catch a hawk by digging a hole in the ground, big enough to accommodate a man easily. This is covered by a thatched roof with an opening in the centre. Much may be said about the persons' sense of dedication as he gets into this crude foxhole for the whole day with, only a live pigeon tied to a long line, for company, and which he continually, at intervals, throws out and gently draws back into the gravelike darkness of the hole in the ground. This procedure is bound to attract any hawk within a short distance of some five hundred yards or so. If the location of this trap lies in the path of migratory birds of prey the ultimate chances of success are promising and many. Whenever a wild hawk grabs the pigeon, it is very subtly drawn through the hole in the roof by the trapper and in the same movement the folded lid is pushed back throwing the interior of the fox hole into complete darkness. The hawk is grabbed and hooded and the hole in the roof once again exposed to receive the next visitor.

We now come to the latest American method of trapping a falcon. In this case all that is needed is a spade, a piece of string, and a falcon that has just been driven away from its kill, but one that still hangs around within sighting distance. Also required is a guy who does not mind playing dead for a short while and an assistant who will, after some little practice in this sort of trade, automatically turn out to be an excellent grave digger. The would be proud possessor of the falcon, lies flat on the ground in not so proud a manner, and in this attitude is heaped all over with the good earth from which he was created and to which he is bound to return one day. Sand is heaped even over his head and only his lips

and a part of his nose are left bare. Just another way of getting buried alive. The dead pigeon is tied to a string which the living dead holds in his right hand. The pigeon lies close to his left hand which also is buried by a generous layer of earth. If the falcon is foolish enough not to see this ruse, and flies back to its kill simply to fall into the clutches of the man from the grave, it has only itself to blame. We do hear from time to time of such exploits though I feel it is not worth the bother. It certainly is not a very sensible idea and is comparable to the old Arab way of catching falcons.

A heavy dust storm in the desert will confine falcons to their perches on the sand dunes and at such times Arab falconers try to catch them by approaching from the windward side.

Assuming that within the incidence of any of the forementioned methods, the falconer is able to congratulate himself in capturing a hawk or falcon, he will now be confronted with the task of training his bird. Up to a certain point, training follows a given pattern whether it be a hawk you are working upon or a falcon. I do not mention eagles as, in principle it will not be any different yet, a novice or even a mediocre falconer is bound to find the experience terrifying if not totally dangerous.

After being decked with a "Rufter's" hood and treated to Jesses, swivel, leash and bells, the hawk is left to rest on a block perch. As in all else, the beginning is very important and, the first twenty four hours are vital in establishing a firm understanding between bird and man. Any mistake or a step in the wrong direction at this stage, could have a far reaching and possibly disastrous effect. Therefore all efforts will have to be made to establish a friendship that will progressively grow from day to day, proportionate to the training programme. It is further to be clearly understood that there is no shortcut or easy way of going about the business. The use of any form of dope is to be at all costs avoided. After two hours of rest the hawk is to be carried on the fist for a short while. Later an attempt is made to feed it. A piece of meat is drawn across the hawk's toes and by gently squeezing them it is induced to peck at the abnoxious treatment it is made to suffer. Just then a morsel of cut meat is held in front of its beak and this, with a little persuasion may be slipped into its mouth.

Manning or carrying the hawk around, will greatly help reduce its fear of man for, though hooded it remains, yet it senses the presence of people around and, becomes used to the human voice. Food is to be offered regularly three times in twenty-four hours. Each time only a quarter full crop is allowed and, every time feeding is attempted a whistle is blown. In a very short while it will identify this noise with food and whenever a whistle is blown it will know that it is to be fed. All this while it remains hooded.

Once the hawk shows that it understands the sound of the whistle, an attempt will have to be made to feed it without the hood and to give this trial a fair chance of success, it has to

be carried out indoors, and in the subdued light of a very low wattage electric glow lamp. The Ruffer's hood is now discarded and in its place is introduced a regular hood, preferably of the Anglo-Indian design which is soft and is 'broken' in. It should be borne in mind that a tight fitting hood, pinching at the eyes or elsewhere can easily turn a fine hawk into one that will soon become hoodshy, a condition that is almost impossible to cure. Therefore all the more reason to closely observe the inside of a newly clamped hood for telltale marks and damp patches that have got to be immediately removed. In this hood, two small holes directly in front of the hawk's eyes, and to the order of two millimetres diameter are punched. These perforations allow the hawk a very restricted view of what lies immediately in front of it. The gradual dilation of these peepholes, slowly introduces the hawk to its new environments, without causing it any unnecessary alarm. The holes are daily increased in diameter and feeding and handling the hawk is kept up as before. As soon as the holes are enlarged to the size of the hawk's eyes, unhooding it for very short intervals during the day is attempted. The exercise is best carried out away from the presence of human beings. However with the passage of another few days, hooding and unhooding may be done in the presence of friends who have previously been briefed to remain comparatively still during the operation. At feeding time the hawk is allowed to remain on the perch and the falconer with a piece of meat in his hand keeps his extended fist a few feet away from it. The whistle is gently blown and, it will be found that after a little while the hawk will gingerly step off the perch to sit on the extended hand offering it food. Distance between hand and perch is slowly increased so that after a bit the hawk will be flying a few feet when beckoned, to land on the fist.

Beyond this point falcons will be treated to a different line of training. In the case of hawks however, the calling distance is increased daily till it is made to fly, without hesitation, distances beyond thirty metres or so. All this time the hawk has been made to fly on creance which is merely a long line attached to the jesses just below the swivel. Now this is no longer needed and the hawk is freed of all attachments other than the jesses proper and thrown up a tree. It is then called back to the fist and this exercise repeated four or five times every day. A hawk's weight is slightly reduced prior to entering it to quarry however, it has to be remembered that though hunger can, to a certain degree, control a hawk, it cannot be relied upon beyond a certain point and if work is to be expected the hawk should be kept in the highest health condition so that it is at all times as keen as possible and maintains a prodigious appetite. When brought out to the hunting field and during the chase as well as the ensuing struggle, it should be able to employ all its faculties to their full capacity. Ultimately a stage will be reached when the hawk at the sound of a squeak will with a spasmodic jerk squeeze the gloved fist. This will denote that the hawk is flying condition which in falconer's parlance is termed being in "Yarak". Once in "yarak" the hawk should be entered to quarry without any loss of time and every effort has got to be

made to ensure that the first attempt is successful. If the bird is a "goshawk" a young rabbit or moorhen will offer easy prey. In the case of sparrowhawks, an owl or a quail is recommended for the first flight at game.

In the training of falcons, as already mentioned, the first stage is not dissimilar to that given to a hawk. In the second stage of its training it is introduced to the lure which is a freshly killed pigeon held under its feet. As soon as the falcon has tasted a little blood from this dead pigeon, the lure is gently drawn away from its talons and dropped on to the floor. The whistle is blown softly and repeatedly till the falcon steps down to the dead bird. The distance between falcon and lure is daily increased till it flies, on the creance, to the lure from over thirty yards or so. As soon as it is found that the falcon flies to the lure without any hesitation, the creance is removed and the falcon called to the lure but, this time as the falcon closes in on to it the lure is withdrawn and hidden. Naturally the falcon will pass the falconer and rising up will try to see where the lure has disappeared and at this moment the lure is again thrown out by the falconer. It will be seen that the falcon turning round will bank on one wing and stoop to the lure. In this manner the number of stoops is increased to twenty or thirty at a stretch.

During the next stage, of the lure after being swung a couple of times by the falconer, is hidden in the bag. This will cause the falcon to circle in the air over its owner and, after describing a few circles will make for some tree. At this point the lure is immediately thrown out and the falcon is called to it. Thus a falcon is induced to fly round and round its owner till it rises high up and opening out its tail actually starts to soar. To start with, one minute of soaring is good enough though, when fully trained I have had falcons soaring at a great height and waiting on, as it is known, for lengths of time in many cases exceeding half an hour. Depending on the falcon that is waiting on high up in the sky, an attempt is made to flush game out of cover. Usually grouse or partridge afford a lot of fun and excitement. This, however, is not the only way a falcon is employed in the hunting field for, in the case of rook hawking, the falcon is cast from the hand at the quarry from considerable distance. When kites or owls are being hunted, it is the quarry that in a desperate bid, rises in ever mounting spirals to out fly its pursuer. In a short work of this nature it is impossible to give all details or, dilate upon the many and interesting sides to this kind of sport. In fact many books have been written on the subject and, I hope people will continue to write about their experiences and experiments in this field.

Though twice as difficult to train, when compared to the long wings, the accipiter group of birds are quite plentiful. The most magnificent bird in this subfamily of "ACCIPI-TRINAE" is the "ASTUR PAUMBARIUS" and which to the falconer is known as the "Goshawk". No doubt these birds are pretty difficult to tame and train, but once trained they are capable of bringing a great variety of game to bag. Ground game such as hares and

rabbits are taken with ease. In the wild state its principal food consists of partridges, pheasants, and squirrels. Its great strength enables to destroy heavy game even as large as the Indian peafowl. In the juvenile state, it has elongated spots all over its crop and breast, the eyes being a pale yellow in colour but after each successive moult the colour changes, and deepens to a dark red in very old birds. Male "goshawks" weigh about one pound and eight ounces and these may very successfully be employed against game such as partridges, crows and squirrels.

Next in the "Accipiter" group come the sparrowhawks. These brave little birds if trained properly will tackle game almost twice their size. The sparrowhawk is the only bird in the hawk tribe which in its juvenile state, bears arrowheaded markings all over its crop and belly. As the age of a sparrowhawk advances, these arrowheads assume a "V" formation and the "V" becomes more and more shallow in appearance so that in the case of very old birds horizontal bars are noticed running across their front and crop. The eyes also will be noticed to turn to a deep red hue. I have seen a sparrowhawk with very dark brown eyes. This bird was certainly a freak of nature for as far as my experience goes, there has never been a sparrowhawk with eyes of a similar shade. Like in the case of any other hawk, this bird also is fit for hunting with, in country where there is abundant cover. I have, with my sparrowhawks been able to, capture partridges, barnowls, treepies, quails, and squirrels. I have also got it on record, of a "teal" that was once forced to pay tribute to this stouche-arted little hawk. Capable of very determined dashes, it would have been the ideal hawk for the beginner had it not been plagued with an extra delicate constitution.

In Persian, and the persians claim to be the original falconers, there is a saying, which when translated reads as follows, "with the goshawk in place of king, and the "gos" tiercel playing the part of the prime minister, the sparrowhawk holds the rank of a prince". I am in full agreement with the wise persian falconer for he has in the least possible words, not only described but also put the birds of the hawk tribe in their proper order and stations in life. In India there may quite commonly be found, two lesser versions of the sparrowhawk, The Shikra "Accipiter Baidus" and the Bisra sparrowhawk. This latter bird, in performance lies somewhere in between the "shikra" and accipiter "nisus". The "shikra" on the other hand is a lusty fellow and capable of taking a huge amount of abuse at the hands of any beginner.

We now consider the "long wings" or falcons that are employed in this ancient sport. Because of its wide distribution, and its speed, as well as great courage, the "peregrine" falcon is much favoured by most felconers. Weighing about two and a half pounds, when in flying condition, it is able to with ease, tackle pheasants, ducks, herons, kites, rabbits, rooks, grouse, and magpies. Many years ago I had a female peregrine which was fond of not only "stone" Plover but, the Indian Hornbill as well. In the juvenile state these falcons are decked with elongated spots all over their crop and belly but, these spots change over to bars

as the bird grows older with each moult every year. Falcons hailing from Siberia, are generally very large and much darker than the maritime Peregrines. The tiercels, stand up to the female's shoulder and may be trained to fly plover, partridge and grouse, with great success. In the case of all peregrine/peregrinator group of falcons, the change in their frontal marking with each moult is a feature quite absent in the desert falcons.

The peregrine's smaller brother the "Shahin Falcon" (and there are two distinct types of Shahins) is not only a pretty falcon but also the fastest bird I have ever come across. Time and without number I have had occasion to marvel, spell bound, at the terrific speed which these birds can fly. I have seen a Shahin fly out of a tree after a flock of parrots that were going full speed and before the flock had moved fifty yards the falcon grabbed one out of the flock. In a straight flight there is no bird capable of more speed than the black shahin "Sultan Falcon" or the "Peregrinus Peregrinator" of the naturalist. "Falco Bybalonicus" or the red capped shahin, is very plentiful in Khorasan and Western Baluchistan. In haggard birds the head is of a fine rich red colour, hence the name "Red Naped" shahin. In the case of the red as well as the black shahin, the weight is around one pound ten ounces. With the red Naped Shahin, I have had many happy hours of Chakore and sandgrouse hunting in the south of Afghanistan. The Sultan Falcon may tackle birds as large as the Indian Pheasant and many a jungle fowl have I had the good fortune to capture with my falcons. Of course another thing that has occasionally fallen to my Shahins has been the handsome Mallard Duck, a winter visitor to this part of the world. Here also as in the case of the peregrine falcon striated frontal markings change to a horizontal pattern of bars after the first moult and these bars further become more and more narrow in width after each moult.

And this brings us to the Lanner Falcon "Falco Biarmicus". Though it is very plentiful in Afghanistan it ranges all over Baluchistan, Persia, and countries bordering the Persian Gulf. It is a bird somewhere in between the peregrine group and the true desert falcons, and may be classed with the "Prairie Falcon" of America. If it is similar to the Prairie falcon it is so only in size and shape. Otherwise I have a feeling that this wonderful falcon is not only the most intelligent in the falcon tribe but also is the bravest I have seen. I have very often killed the HUBRA BUSTARD and have also hunted hares on many occasions with my Lanner (and the hares off the coast of Makaran are real monsters). It waits on perfectly and will follow dogs that quarter to flush game. Crows and kites are easily captured. It is of a co-operative disposition and not much given to carrying game it kills. It certainly is the beginner's falcon though I hate to see so noble and splendid a bird unduely suffer at the hands of a novice.

A few rungs lower in the same ladder may be seen the "Lugger Falcon". I have come across two distinct types of Lugger Falcons. The spotted frontal kind of birds are very numerous all over the great plain of India. The other kind is of a monotone dusty brown shade and is distributed all over western India reaching as far as Herat in Afghanistan.

They are not in a class with the noble falcons mentioned earlier but, are co-operative and can be trained to hunt in pairs. This way it is sometimes possible to get hares with them. On the whole however they lack the speed and determination of the lanner falcon or any of the peregrine group of falcons. In fact they are trivial characters though an aspirant falconer is welcome to try his hand at training them.

It is difficult to fix any given place in the falcon hierarchy for our friend the Saker "Falco Cherrug Cherrug" It seems to be a close relative of the "Gyr falcon" and in size if not in weight it has the advantage. Enigmatical and of many moods the Saker Falcon defies a proper description. At times it could, by its many and wonderful deeds win a province from Lucullus. At other times one certainly feels like letting it go and shouting "good riddance". It is a true Desert Falcon and rarely seen in wooded country. Here also as in the case of the Luger falcon, the birds are found in two shades. However it is indeed very surprising that both phases are to be found in the same locality. It ranges all over Persia, Arabia, Afghanistan, Baluchistan, the Punjab and as far south as the Deccan in India. Also it is to be found in Tibet and Chinese Central Asia. Persians and Arabs hunt the "gazelle" antelope and during the heyday of falconry "bustard" and hares were hunted in India by the Indian falconers. As in the case of all other falcons from the desert, age identification is extremely difficult and unless the falconer has huge experience in these matters no definite yardstick for its true assesment can be laid down. On the whole it would be better for the novice to give this bird a wide berth.

From all that has been written about it the "Gyr" falcon does appear to be the overlord in the realm of falcondom. I unfortunately have had no first hand experience with the gentry and will leave its description to more experienced hands.

Last, though certainly not the least in this noble line of falcons in the dear little "Merlin Falcon" (*Falco chicquera ruficollis*) commonly known as the red headed merlin. It is to be found in considerable numbers all over the plain of India and the Northern foothills. In the west it ranges right up to Persia and Irak. The female is about ten and a half ounces in weight though eight ounces is more or less an average figure. There are two things that make this falcon stand out in bold relief and put it in a distinct class of its own. In the first place the primary wing feathers, as in the case of the "gyr" falcon, fall short of the tip of the tail by almost an inch. Secondly, it is the only falcon, that is trained after the manner of hawks. It is the only case where a falcon does not soar and has to be always slipped from the fist at game. Certainly it is a very fast bird and extremely courageous. In spite of its small size, I have hunted the grey as well as the black partridge with it. Owls, treepies, bluejays, starlings and quail, are also some of the game that may be hunted with it.

There is of course the European counterpart to this little falcon which I am told can capture whatever game a sparrowhawk can kill. In the case of the red headed merlin age

identification is not so difficult a task. The red or rufous portion on the head, in juvenile birds will be seen to extend from the top down to the nape of the neck and will touch the shoulders. With every successive moult however this patch continue to shrink till it covers the top and back of the head only. Its back is of a silver-grey colour and the front absolutely white, with black horizontal bars extending from the chin down to the belly.

And so the road Falconry has taken, throughout the centuries, has laid bare and brought to light many hidden layers of history. Chengez Khan and Raja Ruderdeva, Thamuras and Alexander The Great, the archbishop of Canterbury and the Emperors of Japan, have all been associated with this all embracing and noble pastime. It has been recorded that Thomas A. Becket's falcon that had sunk its claws into the back of a drake fell with it into a swift flowing stream. Its owner jumped into the water to retrieve his precious hawk but was carried away by the strong current towards a millwheel. And we are told by the same source, believe it or not, that as the future Archbishop of Canterbury with his falcon and the dead drake drew close, the millwheel stopped of its own accord. Ancient history tells us that Chinese scholars found it most edifying to walk in a garden with a falcon perched on their fist. It once solved a big problem for Queen Victoria. After building the Crystal Palace, it became evident that the herd of sparrows that had invaded its sanctity, and taken up residence within its geometric magnificence, would not leave. Firing a gun within the confines of all that much glass was out of the question and the naughty denizens thrived till it was suggested to Her Majesty to employ sparrowhawks for the purpose of driving out the unbidden guests.

Today falcons are employed in keeping airfields free from collision by birds with jet aircraft (commonly known as bird strikes). It has been estimated that such damage has cost the BOAC alone a little under £1000,000 (one million pounds) in about five years. Seagulls and other birds such as starlings foul the intake of a jet engine where they are sucked by its action. Prior to using falcons many experiments were tried to rid the airfield from this menace. Scaring shots, flares, bangers, and taped bird distress calls were all tried with not much success. Falcons were introduced and it became apparent that the very sight of a falcon was enough to scare the intruding seagulls or rooks and clear the airfield for many hours. Thus by staggering the patrol flight of trained falcons over an airfield, it soon became possible to keep it flight-worthy for the whole day.

During World War II, this sport was used as a secret weapon. By establishing stations along the east coast of England, the British Intelligence Service, was able to have these areas patrolled by trained falcons and thus intercept carrier pigeons loaded with information of vital importance to the security of the island. At times when a loaded pigeon could be secured intact it would be possible to substitute information diametrically in opposition to the one intended by the enemy agent and, thereby confuse the Germans.

Today the United States Airforce Academy at Colorado Springs makes it obligatory for cadets to train and fly falcons at halftime celebrations of football games. The Mews of this academy are open to the public on special days during each week. This is in recognition to the sports character building qualities.

In Spain the sport has government approval and support. In most European countries there are falconers clubs and once a year or so falconers from all over come to a predetermined place to hold a falconer's meet. The problem of obtaining hawks and falcons for the use of future aspirant falconers, is also receiving attention by specialists on both sides of the Atlantic. Attempts have been carried out with success to breed hawks under controlled conditions. The famous German falconer Renz Waller has, I am informed, succeeded in breeding from a pair of captive peregrines. Henry Kendell of the U.S A. under captive Prairie Falcons, raised two broods of young. Frank Beebe of Canada also was able to raise peregrines from his old peregrines in captivity.

In parting I once more caution my reader, that in dealings with birds of prey, their reasoning and intelligence has to be kept in mind all the time. This is particularly true if one is training them for the hunting field. One has only to follow the experiences of d Arcussials in "letters from Philoierax to Philofalco" in order to gain some idea of the staggering intelligence of birds of prey. There have been times when my eagle on hearing my spaniel "Honey" barking at game in some remote corner of the bush has flown over to investigate the cause of this canine perturbation. For there has developed over the last four years, a sense of understanding pointing towards a common interest between eagle and dog. The dog flushes game for the eagle and by the simple signal of barking, gives warning of its whereabouts and impending break from cover. This way the eagle positions itself on the nearest tree so that, when the action takes place, it will be in the most advantageous position to launch an attack.

Not all difficulties an aspirant falconer faces in his early endeavours, can be properly discussed in a work of this length. My own experiences have been many and any attempt to pass these to the reader undoubtedly require many more pages. The innumerable pitfalls, and discouragements would if recorded, seemingly deny the excellence of this magnificent sport. However, caution, patience and determination, are the best practical hints which I unreservedly advocate and which I hope will make not only the arduous task of training easier, but also the reward more promising and within reach. This work may be treated as a mere guide and some information necessary to the aspirant falconer. Practice and hard work, and one's own efforts alone can spell success irrespective of any amount of exercise, or instructions from a book.

In farewell I can only wish my reader who intends to take up falconry as a hobby, all the best, and good luck.

Transplanting of Indian Lion in Uttar Pradesh State

By

S.S. NEGI, B.Sc.

Retired Chief Wild Life Warden, U.P.

It is well known that at one time the Lion occurred over the whole of West, North and Central India. It is a historical fact that Moghul Emperor, Babar, used to hunt Lions in the forests along the Yamuna river between Delhi and Agra.

It is unfortunate that this fine animal has been wiped out from the country except from the remote forests of 'Gir' situated in Saurashtra, North-West of Bombay. There, too, the persecution of lions by sportsmen continued relentlessly and by the beginning of the twentieth century only about a dozen or two remained. It was fortunate that at that time, the then Viceroy of India, Lord Curzon, visited Gir Forests for a shoot. He realised the gravity of the situation and came to its rescue by immediately issuing orders prohibiting its shooting. But for his intervention, the Indian Lion would have completely disappeared from the Indian sub-continent. As a result of protection afforded, the species started multiplying and it is now reported that there are between 250 to 300 lions in the Gir Forests.

There are varying views about the total disappearance of the Lion from the U.P. Gangetic plain, Rajasthan and Madhya Pradesh. One of the reasons ascribed is the encroachment of the tiger on the habitat of the lion. The tiger, believed to be more cunning and more powerful than the lion, killed off or drove away the lion from its habitat. This is a debatable point and cannot be accepted as wholly responsible for its extermination. The real reasons, to my mind, for its extermination are large-scale jungle clearance for agriculture in the plains on the advent of peaceful conditions in India, its gregarious habits, preference for open savannah country and low scrub forests, and coming out in the open at any time of the day; whereas the tiger hides himself in densely wooded areas during the day and is rarely seen in the open after dawn and before sunset and could, therefore, defend itself from the onslaught of sportsmen. There are instances when the whole family of lions consisting of 5 or 6 or even more were wiped out by sportsmen in a single day, whereas the tiger, because of its shy nature, recedes into high forest in the day and a sportsman may consider himself fortunate if he could shoot even one tiger in a fortnight's shoot, except in well organised 'hankwas' (beats).

Anyway, whatever may be the reasons for its total disappearance from the plains of India, the fact remains that they are now confined to a small tract of the country. This posed a serious problem about their survival, for in case of epidemic or any other calamity, this fine

a nimal will completely disappear from the country. Therefore, the only alternative to ensure its continuance is to find alternative homes in as many places as may be found suitable for their introduction.

With this end in view, the Executive Committee of the Indian Board for Wild Life at its meeting at Sasan Gir in the year 1956 accepted the offer of the Uttar Pradesh Government to introduce lions in the Chakia forests of the State. It was the first experiment to find an alternative home for the Indian Lion in this country.

In pursuance of this decision, an area of about 37 sq. miles with a perimeter of about 18 miles was selected in the Chakia forests and a new sanctuary, known as Chandraprabha Sanctuary named after the picturesque Chandraprabha river which flows through it, was formed. It adjoins the Chandraprabha dam constructed on the Chandraprabha river which adds to the beauty of the Sanctuary.

It is situated in the Vindhyan region and the terrain, vegetation and climate is practically similar to that obtained in the Gir Forests. It abounds in blue bulls and pigs, Chinkaras, Chitals and Sambhars are also found in fair numbers. There are a few panthers but no tigers in the area. Thus the area was considered quite suitable for the introduction of lions.

Although the decision to introduce lions in the U.P. was taken in the year 1956 at Sasan Gir, it took one year to complete arrangement for their introduction in the Sanctuary. One lion and two lionesses were captured from the Gir Forests and kept in the Shakargarh Zoo for 9 months. During this period, a 9-foot high barbed-wire fence was constructed around the boundary of the Sanctuary to keep out domestic cattle which abound in the area. One tourist hut and one students dormitory overlooking the Chandraprabha river were constructed to attract visitors. Also three 'machans' were constructed overlooking perennial streams to enable visitors to view and photograph the lions and other wild animals in their natural environment.

After having completed all the arrangements for the reception of lions, one lion and two lionesses were transported by rail from Shakargarh. They began their long and arduous journey on 12th November and arrived at Chandraprabha on 21st November, 1957. The Wild Life Warden, who accompanied the lions, had a very tough time in keeping away people, who had collected in large numbers at stations enroute to see the lions.

The lions were released on December 2, 1957 in a 10-acre enclosure constructed inside the main fence. The object of releasing the lions in a small enclosure was to devise a suitable mechanism for their release from the cages and also to phase the release in two stages. It was considered desirable to keep the lions inside the small enclosure and feed them on live-

baits for sometime, as it was feared that they may have lost their habit of preying on wild animals on account of their having been accustomed to hand-feeding during their captivity in the Shakargarh Zoo for about 9 months.

The inner enclosure was dismantled on January 8, 1958 and the lions were set free in the Sanctuary area. Thereafter, they began roaming about freely and leading their natural life. They preyed on the wild animals, which were plentiful in the area, particularly on blue-bull and sambhur which are easier to catch than chital and *Chinkaras*. A strict watch was kept on their movements and in order to keep them confined to the Sanctuary area, live baits were tied at regular intervals near the three 'machans' till the time I retired in June, 1958. Afterwards, baits were tied off and on to localise them for sight-census.

After about 3 months of the release, the older of the two lionesses, Rani, was seen with one cub. Having got acclimatised to the new surrounding, they started multiplying and their number increased to 4 in 1958, 5 in 1960, 7 in 1962 and 11 in 1965. Thereafter, they disappeared from the Sanctuary and were not even seen in the adjoining forests of Varanasi and Mirzapur Forest Divisions. It is presumed that they either migrated to some unapproachable and remote forests of Bihar or may have been shot or poisoned out by villagers as it happened in the Gir Forests.

The reasons for their disappearance can be ascribed to:—

- (a) the area of 37 sq. miles proved to be too small to contain as many as eleven animals. They did not confine themselves exclusively to the Sanctuary and very often went out into the adjoining forests.
- (b) the forest around the Sanctuary is open to unrestricted and heavy grazing which meant constant disturbance to the animals;
- (c) no scientific methods were adopted to restrict their movement. After release, it was most essential to keep the animals under constant observation to see how they reacted to the new habitat, what were the local frustrations they encountered and whether they faced serious competition from local carnivores. Also they should have been fed regularly on live baits for a considerably long time.

However, the fact that the lions multiplied and established themselves within a short time clearly indicates that the open scrub and bamboo forests of the Vindhyan Region are suitable for the introduction of the lions and the experiment of transplanting lions in the Uttar Pradesh has proved a success beyond and doubt. It was subsequent lack of follow-up action and smallness of the area which appear to be the reason for their disappearance.

Therefore, there is no cause for pessimism in the success of our efforts to find a second home for the lions provided a suitable habitat is selected and adequate steps are taken to keep a constant vigil on their movements and reactions to the new surroundings. For this purpose, the following steps are essential:—

- (a) A minimum area of not less than 110 to 210 sq. miles should be selected. It should not be in a narrow strip and should be of sufficient depth;
- (b) All cultivation and grazing inside the area should be prohibited;
- (c) The area selected should be closed to shooting and grazing at least 3 years in advance;
- (d) Sufficient number of salt licks and water holes should be provided;
- (e) Larger carnivores should be eliminated as far as possible. This is necessary to protect the lions as well as conserve game to provide natural food to the lions;
- (f) Live-baits should be tied at suitable spots regularly for a considerably long time. In the meantime a Chital farm should be established in the vicinity of the Sanctuary. Once the farm is established, the lions can be switched on to feeding on Chitals regularly by relasing them in the Sanctuary;
- (g) Necessary protection should be afforded against poaching and poisoning by villagers. In case a domestic animal is killed by a lion, adequate compensation should be paid to the villagers so that they may not regard the lions as their enemy.

The above pre-requisites will involve financial implications and must be considered fully before launching the experiment for introducing lions in any tract. Forests of Vindhyan Region in the Mirzapur district of Uttar Pradesh are suitable in all respects for providing alternative home for the lions, but before launching upon another experiment it should be ensured that all the above pre-requisites are provided, otherwise it will end in dismal failure.

The Jungle Fowl

THE ENDANGERED RED JUNGLE FOWL (*Gallus gallus*)

By

C.L. BHATIA

AIFC, IFS, D.F.O., Dehra Dun, U.P.

No other bird has such an intimate association with man, nor has contributed more to his welfare than the red jungle fowl. It has been, and still is, one of the most beautiful and important birds of the world from which have originated all the varieties of domestic chicken. It has penetrated to almost every corner of the globe, except in frigid climates; having originated in the forests of Southeastern Asia. In India it is distributed throughout the north, specially the Himalayan foothills country, to eastern Assam, South to the Godavari river in eastern Madhya Pradesh. Though the exact date of its origin is not known, it has been living since 3000 B.C., as available records show that men first took these fowl into their compounds and domesticated them more than 5,000 years ago. It is believed to have reached central Europe as early as 1500 B.C. and was well established there before the Romans came. It was carried to the Hawaiian Islands and from there to the New World long before the white man's ships explored the Pacific. While the domestic birds have developed a hundred standard breeds or more, their wild brethren in the forest have started to decrease in alarming numbers, and face a future that looks far from bright, despite the fact that they are hardy and can recover quickly from disaster, if given a chance.

The decline, can not be attributed, to gun-pressure alone. It is due, mainly, to man's own actions in changing their habitat.

The Changing Habitat

The jungle fowl inhabits deciduous as well as evergreen forests, plain and hill, but it is particularly fond of Lantana and other scrub growing on the site of abandoned forest clearings. Parties of perhaps a cock and 3 or 4 hens come out in the early mornings and afternoons to feed in stubble fields, at the edge of the forest or on the forest roads and fire lines, but they are very shy and wary and scuttle into cover on the least suspicion. With the cutting down of most of the scrub forests for plantations and cultivation, there is hardly any cover or food left. Where forests have been clearfelled for Eucalyptus, one can hardly see any bird life. It is also believed that adding of Aldrex in the soil to prevent attack of white ants in Eucalyptus plantations is a contributory factor towards the decrease of jungle fowl. Aldrex changes the chemical composition of the soil, which in turn changes the whole micro fauna on which the jungle fowl depends. Even spraying with insecticides, which has been widely promoted in a number of our plantations has not only exterminated the

insects but has also resulted in a greater extermination of wild life. If the past eradication programmes are carried out as now projected we shall have been witness, within a single decade, to a great extermination of animal and bird life than in all the previous years of man's history. With the cutting down of the forests, the availability of water has also been affected. Water is not available for miles at a stretch. The ground vegetation has also decreased. What is more, place for breeding is restricted as their minimum requirement of a shallow scrape in dense undergrowth, lined with dry leaves, is no more available. All this shows that modern man has made an ecological nuisance of himself. On the other hand, man is interfering with the ideal roosting area of the jungle fowl. The present schemes of raising pure plantations is adversely affecting all the three factors of habitat, viz., the food, cover and water. The study of close relationship between plants and animal productivity has proved that the dense woods made up of large shady trees, nearly of one kind, was not the most productive of wildlife.

Management Suggested

It is depressing to note that bird awareness and protection is of no importance in this country, whereas in countries like United States of America, and Canada, it receives great attention.

The factors that hold down wildlife populations are listed below, in order of importance.

1. **Environmental Factors**
 - (A) *Habitat deficiencies*:—
 1. Food
 2. Shelter
 - (B) *Physical agencies*:—
 1. Weather conditions
 2. Man's activities
 - (C) *Biotic agencies*:—
 1. Diseases and parasites
 2. Predators
2. **Species factors**
 1. Habit of the species.
 2. Capacity to reproduce

Only a few of these limiting factors can be controlled by man. The species factors are unchangeable as is weather. The effects of predators may be modified somewhat, but with uncertain results. Little can be done about diseases and parasites. The greatest change, fortunately, can be made in the most important factors. Success in managing land to produce more wildlife lies in improving the amount, quality and distribution of habitat.

All wild things need a home. This is called the environment or habitat. Man can do a lot to improve this habitat and make it more congenial for increasing the wildlife population. The important things that make up wildlife habitat are food, cover and water. In the forest, their quality depends on how the forest is used.

The shade of dense forests keeps herbs and shrubs—food of jungle fowl from growing on the ground between the trees. But a well managed forest can produce an abundant food supply. To be really useful, food must be plentiful and close to cover that will furnish protection from enemies and weather. And it must be available in seasons when it is usually scarce. The critical period, in India, for the red jungle fowl is summer. Plants which provide food can be planted in, or on the edges of, small openings inside the forest. These openings are liked by the jungle fowl because here there is usually a good food supply. At the same time, the forest is close by to escape into when danger threatens.

The cover must conceal nests and young, provide shade from the hot sun and shelter from chilling rains. It must allow escape from enemies and it must protect against cold and wind in winter. Good management of cover can be boiled down to three essentials—unburned, ungrazed grass for nesting; dense or thorny shrubs for protection from predators and for nesting; and clumps of evergreens for winter protection. All the three kinds of cover should be close together and close to available food supplies. Trees valuable as cover can be planted. For example, evergreens planted among deciduous species make good winter cover when the leaves have fallen. Many shrubs make good cover when planted at the edges of wildlife openings in the forest.

Nearly all wildlife needs water to drink. Wild fowl obtains water from three sources. Surface or free water, food that contains lot of water, and dew. Well managed forests maintain a protective cover of leaves on the soil. This restrains rain and snow water and helps it to penetrate the soil and thus keep up the flow of springs and streams which in turn provide an abundant water supply. Seeps and springs to provide water and succulent food plants should be developed.

Uncontrolled and wild fire destroys food and cover and has a bad effect on water production. For this reason, every possible effort to prevent fires in the forest should be made. And if perchance, they do start they should be put out quickly. Destructive—large scale and whole sale—cutting, like fire, also damages wildlife habitat.

The jungle fowl needs protection from too heavy hunting. One of the critical periods is during the rearing of the young. Game laws prescribing the proper seasons for hunting and limiting the number of birds that can be taken, should be strictly enforced.

The population of the most obnoxious of the predators, viz., the jackal, fox, wild cat, civet and mongoose, should be kept under control.

Ornithosis, a sort of virus pneumonia is harboured by these birds but it is not exclusive to them. Among the most serious of the insect-borne viruses are several forms of incephalites, or sleeping sickness, and it has been found that birds which are bitten by these insects often act as a reservoir of contagion. Thus when an outbreak occurs, the cry may go up to get rid of the birds but this is clearly impractical. For one thing, the greatest offenders are

domestic fowl, penned ducks and pheasants. The problem must be handled in other ways and biologists and epidemiologists, working together, are seeking the answers.

There has been no concrete scientific evidence, so far, of existence of any numerical fluctuation in the population of red jungle fowl. But no appreciable amount of research work has been done in this direction and there is much scope to probe to determine whether any fluctuation cycle really exists or not. If any such cycle is detected, it can be made use of in regulating the bag-limits accordingly.

What is required is a more consistent national policy for the protection of jungle fowl. Formulating game laws and their strict enforcement is very important but what is more important is a co-ordinated scheme to make the laws more effective and more wide-based. What Dr. Joseph J. Hickey, of University of Wisconsin, U.S.A. says about American birds is equally applicable to all wildlife and the red jungle fowl also. He says "Without a permit you cannot pick up and take home a car-killed Baltimore oriole, but you can, generally with impunity, cut down a tree containing an oriole nest full of young. You cannot shoot a snowy egret, but you can drain off a marsh on which a whole colony of egret nestlings may depend for food. You cannot shoot a Robin but you can kill it with insecticides."

So what we are expected to do to increase the sinking population of the red jungle fowl, in addition to enforcing game laws, is to check indiscriminate clear felling of the forests, protect them from burning and over-grazing, create small openings conducive to wildlife by doing selective fellings; do thoughtful planting to food and cover plants and eliminate predators.

But the wildlife biologists studying the complex relationship between wildlife and their environment, including the effect of land management practices by man, have proved that if man would preserve and encourage the growth of natural food and cover plants essential to wildlife, they could defend themselves against the weather, diseases and predators, as they did before the arrival of man.

Another step to increase the population of the jungle fowl will be to introduce them in new areas having desired habitat conditions.

As a forester we must think of the forest as a combination of soil, water, plants, and animals closely associated and more or less dependent on one another. No living thing of the forest can get along without the help of other living things found there.

In the days ahead, we must use our land wisely and productively. And at the same time we should make our land produce useful wildlife. Certainly a world without birds, or a spring without a song, or a forest without a jungle fowl would be wholly incomplete for any man; for many of us it would be intolerable.

The Tiger in Uttar Pradesh

By

V.B. SINGH, I.F.S.

Chief Wild Life Warden, U.P.

Wildlife in general, and the tiger in particular, has suffered a great deal during the last two decades. There is concern about the future of wildlife in the country in the minds of naturalists and preservationists. But the number of genuine well-wishers of wildlife, contrary to a great deal of platitudinous lip service from others, can be counted on finger tips. There is, however, growing appreciation now about the role of wildlife in the cultural and economic life of the country. Ways and means are now being found to tide over the crisis. A large number of species have been declared as protected and their shooting has been banned completely all over the country. So far tiger was not included in the list of protected animals but the sudden realisation that their number had gone down considerably and the stage had come when its shooting should be banned completely, forced a large number of States in the country to close tiger shooting altogether. The one solution that occurs to every mind to protect and multiply the tiger population in the country is to exclude it from the bag list of the shooting permit. Suggestions and proposals come from various sources to adopt this well known solution to those interested in tackling this problem successfully.

Uttar Pradesh is one of the very few States which still allows tiger shooting. While taking such a decision we have considered the present status of tigers in the State in all its aspects.

The adaptability of tiger to various climatic conditions can easily be judged by the fact that it had a wide geographical distribution from the snowy regions in northern part of Asia to the tropical Indian climate. It once lived in Eastern Turkey and near the Caspian sea and its habitat extended to the Russian Manchuria. It was also found in the Northern Afghanistan and Iran and into the USSR, near Lake Balkhash. The species is not found in the Chinese Turkistan but a few animals still exist in North Korea. A different species of tiger is still found in the southern part of Yunnan which lies at the junction of China, Burma and Laos. The tiger is widely distributed in the far eastern region of Asia, especially in Malaya and is known to have penetrated the Indonesian chain of islands. The tiger territory in India extends from Assam westwards through Bhutan and Nepal to Himachal Pradesh and from Uttar Pradesh and Rajasthan southwards over the whole peninsula. The species was also found in the Indus valley of West Pakistan but the last animal is reported to have been shot in the last century.

It is apparent that tiger is not inhabited in its habitat by climate or topography. All that it requires is good vegetation cover, perennial supply of water and sufficient food. In

India tiger is found in all major types of forests, including the thorny, dry and moist deciduous, semi evergreen and evergreen. Uttar Pradesh which lies between 77.5° and 85° E longitude and 23° and 31.3° N Latitude has an area of 2,94,364 sq km. Under the wide range of climatic conditions of the State, a large number of floristic zones have developed. An area of 45,711.43 sq. miles which is approximately 15.5% of the total geographical area of the State is covered by various forest types. The Sub-Himalayan zone and the Tarai tract along the foothills, extending from Siwalik areas to Gorakhpur constitute the main habitat of this animal. The other main tract where tigers are found are the dry scrub and thorny forests of the Vindhyan Region in the south extending from Varanasi forests to Bundelkhand area. The tiger habitat in Uttar Pradesh covers roughly an area of 11,125 sq km. which is distributed as follows among the various forest divisions.

Divisions	Sq. km Tiger area	No. of tiger	
Siwalik	670	13	
East Dehra Dun	470	12	
West Dehra Dun	260	7	
Total ...	1,400	32	44 sq km per tigers
Landsdowne	650	36	
Kalagarh	523	24	
Corbett Park	502	45	
Bijnor	376	15	
Ramnagar	865	40	
Tarai & Bhabar	920	16	
Haldwani	600	20	
Total ...	4,436	196	22.5 sq km per tiger
Rohilkhand	40	3	
Pilibhit	800	52	
South Kheri	520	39	
North Kheri	985	50	

(Contd.)

Divisions	Sq. km Tiger area	No. of tiger	
Bahraich	340	16	
North Gonda	452	37	
Gorakhpur	117	9	
Total ...	3,414	206	6.5 sq km per tiger
Varanasi	500	10	
North Mirzapur	150	4	
Dudhi	500	9	
Banda	605	18	
Bundelkhand	140	6	
Total ...	1,895	47	40.0 sq km per tiger
Grand Total ...	11,125	481	23 sq km per tiger

Tiger Population

Only about a couple of centuries back the Sub-Himalayan and Tarai regions and most of the Gangetic plain were teeming with wild life. Tigers were also as numerous and their number ran into thousands—probably five thousand or more. The total tiger population of India, as estimated now in 1969 is nearly 4,000 while the number was estimated at forty (40) or fifty (50) thousand only half a century back. No proper census of tiger population has been conducted in the State. But during the year 1967-68 and 1968-69 efforts were made to obtain as accurate an estimate of the number as possible through enquiries and observations. Detailed questionnaire was given to each Wild Life Guard and Assistant Wild Life Warden whose jurisdictions were clearly defined. They were required to enquire from knowledgeable sources like local shikaries, graziers and forest staff about the number of tigers and their movements in specific areas. The information as collected and supplemented by the observations of the wild life staff was compiled to give an approximate but conservative estimate. Division-wise details have been given above. The entire habitat of the tiger is

divided into the following four zones which represent typical climate and topography. The number of tigers in each zone is estimated as follows:—

1. Siwalik Region (includes Siwalik, E. Dehra Dun and West Dehra Dun)	32
2. Himalayan forest hills (Lansdowne, Kalagarh, Corbett Park, Bijnor, Ramnagar T and B and Haldwani Divisions)	196
3. Tarai Region (Rohilkhand, Pilibhit, S. Kheri, N. Kheri, Bahraich, N. Gonda, Gorakhpur)	206
4. Vindhyan Region (Varanasi, North Mirzapur, Dudhi, Banda and Bundelkhand).	47
Total:	<u>481</u>

The above figure of 481 tigers in the State, if anything, is on the lower side as only such tigers about the existence of which there is no doubt, have been accounted for in the estimation. There is no doubt that at least 25% of population must have gone unaccounted and this figure may even be as much as 50% also. Even if we do not take this into consideration, it will be a fair guess to keep the tiger population at 500. The bulk of the tiger population is confined to the Himalayan foot hills and Tarai Regions with every 22.5 sq km and 16.5 sq km respectively having a tiger. Siwalik and Vindhyan Regions are now left with only a sprinkling with 44 sq km and 40 sq km respectively having a tiger. While the forests of Vindhyan Regions were never famous for tigers, the Shiwalik Region has suffered a great deal during the last few decades. That the total number of tigers in U.P. has come down to a few hundred from few thousand (around 4 to 5 thousand a century back) calls for immediate probe into the reasons which have lead to this catastrophic state.

Annual Production and Mortality

The average life span of tiger has been variously estimated at 18-20 years. The age of sexual maturity of tigers ranges from 3-4 years. It can be safely estimated that of the total number of 500 tigers in the State, as many as 100 may be below 4 years age. The ratio of male and female encountered in young tigers has been 1:1. There is no reason to believe that this ratio does not exist when the young ones grow up. In fact the possibility of survival of females is always more than those in males. Under no circumstances, therefore, the number of tigresses can be less than that of males. It is accordingly estimated that out of 400, there must be at least 200 tigresses in the State. If young of a tigress survive, each tigress has a litter at most every 2 to 2½ years. A free living tigress that loses her cubs in some mishap is potentially able to have new litter within about 5 months. A tigress gives birth to 2 to 5 cubs in a litter. If from each litter an average of two cubs reach maturity, the average number of young raised per adult tigress per year is one. Accordingly it is estimated that on an average 100 tigers should be added to the population per year. If the total number of tigers shot or killed otherwise does not exceed 100, theoretically there is no reason to assign

shooting as the main cause of depletion of tiger population. Nearly 60 tigers are shot in the State on the average annually. The total number of mortality on account of natural death, poaching and other accidental reasons can not in any case be more than 10 to 15 per year. As against a total mortality of 75 tigers, we have an intake of nearly 100 tiger, which leaves us with an increase of nearly 25 tigers per year. A general feeling among the sportsmen who go out to the forests regularly is that in several areas there has been a definite increase in the number of tigers in this State, though there has not been corresponding increase in the number of other game. There are however, some problem areas where the number has not increased even after closure of tiger shooting for over five years. Such areas are mainly in Dehra Dun forests and elsewhere, where on account of local adverse factors there has been no improvement in the situation. It will be seen that shooting through permits is not responsible for any dissipation of tiger population, if it is suitably regulated and restricted. In fact the causes of general depletion in tiger lie elsewhere.

8. Reasons for Decline

The one reason for the decline of tiger population which occurs to every mind is continuous shooting of tigers allowed in the Reserved forests. It is believed that closing of tiger shooting for 5 or more years is absolutely indicated as a solution to this problem. Tiger shooting on permit has been allowed in our forests since the last many years. The rules regulating tiger shooting were not as stringent as they are today. An average of nearly 100 tigers was shot annually as the following figures will show from the period 46-47 to 54-55.

Year	Number killed		Total
	Tigers	Tigresses	
1946-47	72	44	116
1947-48	55	26	81
1948-49			
1949-50	56	26	82
1950-51	67	27	94
1951-52	65	29	94
1952-53	40	57	97
1953-54	67	39	106
1954-55	61	36	97

The number came down to 73 in 1963-64, but considering the odds against the tiger population, it was decided in 1964-65 to fix a ceiling of fifty tigers which could be allowed to be shot through permit annually. Accordingly with the help of figures available about the number of shooting permits issued and the number of tigers shot during the last ten years, it was decided to close tiger shooting in 64 blocks and permit shooting only in 58 blocks. The

procedure of issuing shooting permit at least two months in advance percluded the possibility of keeping the bag limit within 50 but the number of tigers shot from 1964-65 will indicate definite reduction in the number.

Year	Number killed		Total
	Tigers	Tigresses	
1964-65	32	12	44
1965-66	53	11	64
1966-67	38	11	49
1967-68	39	21	60

As mentioned earlier, the number of tigers allowed to be shot has been so regulated that the possibility of extermination of this species on account of shooting has been completely obviated. In the main tiger habitat as given above there are nearly 481 tigers in an area of 11,125 sq km which brings on the average one tiger per 23 sq km (or 9 Sq. miles). The average density of tiger in the State can be considered as fairly adequate.

We can not increase the number of tigers indefinitely in a limited area without jeopardising not only their own existence but the existence of other wildlife, domestic cattle and human beings. There is an optimum number of tigers that a habitat can sustain. We have only to see if the present habitat can support any more tigers. If it can not, the question of closing tiger shooting and increasing its number in that habitat does not arise. The general depletion in the total number of tigers has been mainly due to the reduction in suitable tiger habitat and deterioration in habitat quality.

In the recent years, vast tracts of land have been cleared for various industrial undertakings, irrigation and power projects. Vast stretches of forests have been felled under the so called 'Reclamation schemes' for expansion of agriculture to meet the mounting pressure of an everincreasing population and to settle refugees. An area covering 1200 sq. miles (3000 sq. km) which formed our best tiger habitat has been clearfelled after independence to meet these demands. The tiger has been the greatest sufferer as bulk of the colonization activities were confined mainly to Terai Tracts all along the Himalayan foot hills. How tigers and other wild life were destroyed in these colonization schemes is not unknown. In addition to this direct loss, the extension of cultivation right upto and inside the reserved forests has been responsible for manifold reasons leading to deterioration of habitat and destruction of

wildlife. Vegetation has been ruined by men and cattle and wildlife has been shot and snared under the pretext of crop protection.

Intensive forest exploitation and raising of plantations of industrial importance are the other two factors responsible for reduction of tiger habitat. There is hardly an area in the forest which is free from human activity. Marking of trees, regular fellings, silvicultural operations, dry markings and fellings, drift wood marking, petty demand sales, extraction of grasses, lopping and grazing by gujars and their buffaloes, etc., go on all over the forest. A shy animal like tiger can not live peacefully under such disturbed conditions. It is either on the move during the days also or seeks refuge in the adjoining sugar fields where interference is comparatively absent. In fact tigresses have been seen to breed and rear their cubs in these fields quite frequently. As if these activities were not enough, large scale plantations are taken up every year in these areas, which involve clear felling of several thousand acres at a stretch. Every year nearly 24,000 hectares are being clearfelled and planted. One can imagine how adversely the destruction of natural habitat must be affecting the tiger population of the state.

While large scale shooting and poaching in the past were also responsible for bringing down the tiger population to the present stage, effective shooting restrictions and vigilance have more or less completely cut down destruction of tiger population on this account. We can claim with confidence that not more than 10 tigers, if at all, are shot annually by poachers and others clandestinely. Poaching of tiger now ceases to be an important adverse factor in this State.

How tiger is protected in Uttar Pradesh

Regulated shooting of tigers in selected shooting blocks is allowed in Uttar Pradesh after careful consideration of the conditions relating to its preservation and multiplication. The position is reviewed regularly and suitable steps are taken in time. In fact as mentioned earlier, necessary measures for the protection of tiger have been taken in stages since the last many years and these have been intensified during the last ten years.

In early thirties the 'Association for the Preservation of Game in U.P.' was formed under the patronship of Sir Malcolm Hailey, Governor of United Province with such noted naturalists as Jim Corbett and Hasan Abid Jafry as Hony. Secretaries. Much useful work was done by this association and as result of its efforts and recommendations the (Hailey) Corbett National Park, a tiger refuge in the real sense, was constituted in 1935. The area of this park was extended in 1966 from 125 sq. miles to 201 sq. miles to include the adjoining areas rich in tiger population. In addition there exist at present 6 other sanctuaries, which include ideal tiger habitats, spread over the State from Dehra Dun to Varanasi. These sanctuaries provide breeding areas and the Corbett National Park can be considered as the nursery for the tigers.

There is no doubt that the overflow of tigers on account of regular annual breeding in the park is naturally distributed in the adjoining forests of Kalagarh, Lansdowne and Ramnagar divisions. One has only to enquire from the adjoining villages to find out how the tiger population has increased in their forests

Out of a total of 122 shooting blocks 64 blocks were closed to tiger during 1968-69 shooting season. In the coming shooting season of 1969-70 eight (8) more blocks have been added to the closed list. Such blocks which were either overshot or which are considered to provide good breeding areas are included in this list. Some of the blocks can be and are reopened after 5 or more years and in their places equal number or more shooting blocks are closed. This periodical and rotational closure gives and provides them an opportunity to breed and multiply unmolested.

Tiger shooting is closed from 1st June to 15th October. From the coming shooting season 1969-70 the month of May has also been included in the closed period. Thus no tiger shooting is allowed in the State for nearly six months in a year. Male tigers 8' and female below 7' are treated as tiger cubs and no one is allowed to shoot them. Shooting of tigers is allowed during the day only between sun rise and sunset. Tigers are not included in the bag limit allowed under shooting permit unless the applicant possesses rifle of 375 magnum or 400 bore non-magnum and above with at least 300 grains bullet weight and above. Carrying of slugs and buck shots is prohibited. Not more than one tiger is allowed on a permit and no one can have more than two blocks in a year. Tigers can not now be declared as cattle lifters arbitrarily. If a tiger has killed at least five heads of cattle within one mile of the place where the first animal was killed and that too within a period of six months, then only a tiger can be declared a cattle lifter. Other measures like imposing of enhanced royalty on tigresses, fixing the number of elephants a permit holder can use in beats and declaring animals shot in protection of self and property are on way. These measures though fairly adequate need regular strengthening. Their strict and rigid enforcement has saved our tiger population from dissipation.

Conclusion

Tiger is surviving in this State against various odds on account of its hardness, cunning and seclusive habit as also on account of the protective measures taken in Uttar Pradesh. While there is no room for complacency, there is hardly any reason to be pessimistic about its future survival. Continued vigilance and proper management will not permit destruction of tiger at the hands of poachers or pseudo shikaris. The greater danger to tiger comes from another quarter, viz., growing civilization and intensive exploitation of forests. If we go on loosing tiger habitats to cultivation, colonies, industrial projects and plantations, no one can save tigers in this State even if shooting by permit is completely closed. Future of tiger, therefore, lies only in the protection of its habitat.

Reproductive Pattern of Some Indian Mammals

By

K.S. SANKHALA AND J.H. DESAI

SUMMARY

This paper presents the number of births, pattern of breeding, and measurements at birth of some Indian primatas, carnivora and ruminants in Delhi Zoological Park from 1959 to 1969 and Jaipur zoo from 1954 to 1963. Interesting birth records of Nilgiri langur, four-horned antelopes, Indian gazelles are also presented. In Delhi Zoological Park there have been instances of birth of twins to 'Axis' deer, hog deer, blackbuck, Nilgai and four-horned antelope. Although the data is small, it has been found that the breeding season of animals in captivity and in the wild compare favourably.

Introduction

Information about life history of many wild animals of India is wanting. Even the common animals like tiger, lion, deer and antelopes have not been systematically studied so far. Some sporadic attempts have been made in the past by hunters and a few naturalists but these observations have not been subsequently confirmed by fresh contributions. The paper presents some original material on breeding pattern of Indian species. It offers comparison of reproductive pattern of Indian mammals in the wild and in captivity. It is hoped that the information will help in understanding the biology of these Indian species to design their protection to save them from extinction.

Delhi Zoological Park is known for its semi-natural large enclosures, group display presenting self-contained eco-units. The data presented and analysed is from the Delhi Zoo. It includes the number of births, pattern of breeding and measurement of births of species from 1959 to 1969.

Unless there is some physical or mental disability it can be assumed that every pair of animals in a zoo has a reproductive potential. The authors have made a complete inventory of the breeding records of Indian mammal collection at the Delhi Zoological Park since the inception of the Park in 1959 to August, 1969. The analysis of the data has brought on record very interesting information of the reproductive patterns of some Indian mammals. Breeding data from 1954 to 1963 of Jaipur zoo has also been quoted to increase the sample value. Jaipur and Delhi are in similar climatic zone (dry and hot) but there is difference of living conditions of animals in the two zoos.

For sake of clarity, this data is presented and discussed in three major groups:—

- (I) *Primates* including Grey langur (*Presbytis entellus*), *Nilgiri langur* (*Presbytis johni*), Lion-tailed monkey (*Macaca silenus*), Bonnet monkey (*Macaca radiata*);
- (II) *Carnivora* including Tiger (*Panthera tigris*), Lion (*Panthera leo*), Leopard (*Panthera pardus*), Himalayan black bear (*Selarnarctos thibetanus*), Sloth bear (*Melursus ursinus*);
- (III) *Ruminantia* including Browantlered deer (*Cervus eldi*), *Sambhar* (*Cervus unicolor*), *Chital* (*Axis axis*), Hog deer (*Hylephus porcinus*), Barking deer (*Muntiacus muntjac*), Mouse deer (*Tragulus meminna*), Blackbuck (*Antelope cervicapra*), *Nilgai* (*Boselaphus tragocamelus*), Four-horned antelope (*Tetracerus quadricornis*) and *Chinkara* (*Gazella gazella*).

Discussions and Conclusion

I. *Primates*. All primates usually produce their young singly but we know little about the birth and infancy of apes and monkeys in their native wilds (Prater, 1965). Although births of genus *Presbytis* have been observed in most months of the year, a large proportion of births may be concentrated into two or three months where seasons produce great variation in climate and vegetation (Napier and Napier, 1967).

In North India (Lucknow), the peak frequency of births in *Presbytis entellus* occur in March, April and May (Jay, 1965). In peninsular India, most of the young are born between January and March and in the Himalayas where winter conditions are harsher, they are produced in April, May and June (Prater, 1965). Prater states that whether there is a well demarcated breeding season for *Nilgiri langur* or not, is not known. Newborn young of lion-tailed macaque are seen regularly in September in South India (Prater, 1965). Birth season of Bonnet monkey is from January to April, a few are born in June and July (Napier and Napier, 1967).

Delhi Zoological Park has been successful in breeding all the above species of primates. Two births of Grey langur are mentioned in the zoo records. One young was born on 26.2.1966 and the other was born on 25.5.1967. A male *Nilgiri langur* was born on 9.4.1964 and three Bonnet monkeys were born during the months of May and June. Although the data is very small to compare the breeding season of above mentioned species in wild and in captivity, it could be observed that all these births in Delhi Zoological Park have taken place well within the breeding season of these species in wild. A pair of lion-tailed monkeys was obtained in 1959 by the Delhi Zoological Park. These monkeys were kept in semi-natural conditions on an Island surrounded by a water moat. In course of time seven births of these monkeys have been recorded during different times of the year from January to October. (Table I). The difference in period of births of lion-tailed monkeys in the wild

and in captivity may be due to change in climate of their native habitat, i.e., South India and Delhi zoo.

An interesting behaviour was recorded in case of Grey langur family which consisted of a grown up pair and a one year old young. The female gave birth to another male young on 25.5.1967. After three and a half months the female died on 3.9.1967. The new born langur was allowed to remain in the cell after the death of the mother. The father started feeding the young with banana pulp. He used to pulp banana pieces in his mouth and force the pasle in the mouth of the young baby. He continued to look after the baby in this manner till the baby started feeding himself.

Table I
Births of Primates in Delhi Zoological Park

Sl. No.	Species	Date of birth	No. born	Measurement at birth		Remarks
				Weigh	Crown to heel length	
1	Grey langur	26.2.66	1	—	—	
		28.5.67	1	—	—	
2	Nilgiri langur	9.4.64	1	500 Grams	25.5 cm	
				(The only to record birth in the knowledge of the world)		
3	Lion-tailed monkey	29.9.61	1			
		18.3.62	1			
		30.6.63	1			
		11.10.63	1			
		13.5.67	1			
		6.1.60	1			
		1.4.69	1			
4	Bonnet monkey	29.5.63	1			
		1.6.66	1			
		12.6.67	1			

II. *Carnivora*. Cubs of carnivora are born in any month of the year though the birth rate may increase markedly at a certain season (Prater, 1965). The tiger mates and reproduces throughout the year but March to June is the peak period for births, there is also a second peak period in September (Sankhala, 1967). In India, majority of youngs are born between February and May (Prater, 1965). There appears to be no particular breeding



Fawn of Axis Deer



Three tiger cubs.



Nilghai feeding its fawns.

season for lions but in the Gir forests, lions mate between October and November and the youngs are produced between January and February (Prater, 1965). Regarding leopard, Prater states that the leopard breed all the year round. Breeding of sloth bear takes place in June in India or even most of the year in Ceylon and about seven months later one or two, seldom three youngs are born in a ground shelter (Walker, 1964). Prater states that the youngs of sloth bear are born between December and January and that of Himalayan black bear late in winter and early in spring.

In Delhi Zoological Park, 65 tigers have been born in 23 litters from 1960 to 1969. The births have occurred almost throughout the year from March to December but the two peak periods of births could be discernible from data (Table II), one from March to June and the other from August to September. This coincides very well with the breeding season of tigers in wild as stated earlier. Similarly, 23 lions have been born in eight litters in Delhi Zoo from 1961 to 1967, forty leopards were born in 29 litters. These births were from January to December which correspond well with the breeding season of leopard in wild. The data of Jaipur zoo also relates a similar evidence and corresponds well with the breeding seasons of three major carnivora, i.e., tiger, lion and leopard in nature.

There have been three births of sloth bear in the months of December to February in Delhi zoo. A total of fourteen Himalayan black bears have been born in nine litters in Delhi Zoological Park from 1961 to 1969. The sloth bears were born in December and February and the Himalayan black bear were born during January—March. These birth dates of sloth bear and Himalayan black bear correspond well with the birth period in nature.

Table II

Species	Date of Birth	Litter size	Date of Birth	Litter size
Tiger	1 18.6.60	3	13 6.3.63	3
	2 24.3.62	4	14 22.3.67	5
	3 7.5.62	3	15 10.7.63	5
	4 12.3.63	3	16 20.8.67	2
	5 3.5.64	2	17 31.8.67	4
	6 20.8.64	3	18 3.5.68	3
	7 22.11.64	2	19 16.6.68	2
	8 23.4.65	3	20 17.6.68	1
	9 11.8.65	2	21 18.10.68	1
	10 15.9.65	1	22 12.11.68	4
	11 20.12.65	3	23 7.6.79	4
	12 21.3.66	2		
			Total	65

(Contd.)

Species	Date of Birth	Litter size	Date of Birth	Litter size
Average litter size 2.9				
Lion	1 26.1.61	2	6 12.12.64	4
	2 16.7.62	2	7 29.5.67	3
	3 30.11.62	3	8 1.7.69	2
	4 4.6.63	3		
	5 12.5.54	4		
Total				23
Average litter size 2.9				
Leopard	1 29.5.60	1	14 18.4.64	2
	2 11.7.60	2	15 6 8.64	2
	3 5.8.60	1	16 29.9.64	1
	4 4.10.60	2	17 13.12.64	2
	5 18.6.61	1	18 3.7.65	2
	6 18.7.61	3	19 3.9.65	2
	7 9.10.61	1	20 7.12.65	1
	8 8.12.62	2	21 10.1.65	2
	9 8.1.63	2	22 19.1.65	1
	10 24.2.63	2	23 16.6.66	1
	11 13.6.63	1	24 29.9.66	2
	12 9.7.63	1	25 10.6.67	1
	13 7.11.63	3		
Total				14
Average litter size 1.6				
Himalayan Black Bear	1 11.2.61	1	5 9.2.63	2
	2 12.2.61	2	6 17.2.64	2
	3 31.3.61	1	7 28.1.64	2
	4 14.2.62	1	8 23.1.62	1
Total				14
Average litter size 1.5				
Sloth Bear	1 5.12.66	2	Average litter size 1.5	
	2 2.12.68	1		
Total		3		

For comparison of size of cubs of larger carnivora born in Delhi zoo, two samples of birth measurements of each species are given in Table III.

Table III
Measurements of Carnivora Cubs at Birth in Delhi Zoological Park

Species	Date of birth	Sex	Weight in kg	Length in cm					
				Total	Front foot	Hind foot	Shoulder height	Ear	Tail
1. Tiger	22.3.67	F	1.300	47.0	11.4	—	16.6	2.9	13.8
	23.3.67	M	1.750	55.0	8.4	—	13.9	2.7	15.0
2. Lion	1.7.69	M	0.650	36.5	8.0	—	—	1.0	10.5
	1.7.69	F	0.550	34.5	7.15	—	—	1.0	8.0
3. Leopard	29.9.66	F	0.575	42.0	9.5	—	—	4.5	13.3
	29.9.66	F	0.600	43.0	10.2	—	—	4.4	16.5
4. Himalayan Black Bear	17.2.64	M	0.400	21.0	—	—	—	—	—
	17.2.64	M	0.400	23.0	—	—	—	—	—
5. Sloth Bear	5.12.66	M	0.300	22.0	—	3.5	—	6.0	—
	5.12.66	F	0.300	21.0	—	3.4	—	6.0	—

*Premature births.

III. *Ruminantia*. According to Asdell (1946), Cervidae, to which *Sambhar*, *Chital*, *Browantlered deer*, *Mouse deer*, *Barking deer* and *Hog deer* belong are seasonally monestrous. Cheatum (1949) indicates that a female deer may have as many as three estrous cycles before conceiving. Cheatum and Morton (1942) state that the length of estrous cycle is about 28 days. The same authors conclude that the estrous period lasts a maximum of 36 hours and probably concludes within a period of 24 hours. In a short period that a doe is in heat, she may be served several times by a buck. The period she will receive a buck lasts only about a day. If mating is unsuccessful, a doe will come into heat again in 28 or 29 days. Mckenzie and Phillips (1930) found that in sheep the duration of estrous was 28.8 hours.

Sterndale (1884) records that the breeding season of blackbuck begins in spring but fawns of all ages may be seen at any time of the year. Finn (1929) mentions that *nilgai* produces a single calf or twin after a gestation period of eight or nine months. The same

author (1929) states that pairing of the *sambhar* takes place in spring in the Himalayas and in late autumn in the peninsula; the gestation period is eight months and the youngs are usually born singly. *Chital* are generally gregarious at all seasons and pairing and production of young may occur at any time, as does the shedding of antlers; the gestation period is six or eight months (Finn, 1929). Schaller (1967) states that the rut of *chital* at Kanha National Park continues throughout the year but the activity increases greatly from March to June, with a peak in May. Prater (1965) states that fawn of *chital* may be met with at any season. According to him (Prater) black buck breed at all times but the main rut takes place between February and March and one or two young are produced at a time. For *nilgai*, he writes that the period of gestation is eight to nine months and youngs are produced at all seasons. Schaller (1967) mentions that blackbuck rut throughout the year, with peaks in March-April and August-October and one fawn per female appears to be the rule. *Sambhar* and Browantlered deer are in rut between November and December and March and April respectively and the young of *sambhar* are born at the commencement of rains, in late May or early June and those of Browantlered deer are born mostly in October (Prater, 1965). Age estimates of fawns of *sambhars* at Kanha National Park reveal that births occur during every month from June to December and perhaps also in April and May (Schaller, 1967).

There is some confusion regarding the number of *chital* fawns born at a time. Prater (1965) records that one to three are born at a time, two being the commoner number while the editors of Bombay Natural History Society (1960) state that only one fawn is born at a time. According to Schaller (1967), there were no twins in the 25 births of *chital* at Alipore Zoo, Calcutta, nor there were any in 97 births at Bombay Zoo, the 225 births at the New York Zoological Park include one set of twins. He further states that at Kanha National Park single fawns seems to be the rule, although on two occasions, he saw a doe accompanied by two small fawns which appeared to be twins. The gestation period of *chital* is six months (Shull, 1962).

Prater (1965) states that *Chinkara* or Indian gazelle have no particular breeding season and one or two fawns are born at a time. He also states that the young of four-horned antelope are born between January or February. Young of hog deer are dropped in April and May and those of barking deer are born at the beginning of the rains (Prater, 1965). Prater (1965) states that the females of mouse deer bring forth their young generally two in number at the end of rains or at the commencement of the cold season.

The Delhi Zoological Park has been successful in breeding all the above species of ruminants in captivity as per data at Table No. IV. The mouse deer, axis deer, hog deer, barking deer and blackbucks have given births to youngs at any time of the year in captivity. The *nilgai* have also produced young irrespective of the season but there are two peak periods

of births, one from March to April and the second from August to October. There is an interesting instance of intra-generic breeding of swamp deer male and offspring of sika deer, axis deer. Delhi Zoo received an out-sized female deer—a cross between sika deer and a female chital fawn from the President's house where sika and axis were living together. This female was kept with the only male swamp deer. As a result of mating between the two, a fawn was born on 23.9.67. This fawn is now growing up and looks like a female swamp deer. On 8.7.1968, the swamp deer and offspring of sika deer $\times$ axis deer gave birth to another fawn. This fawn was born with abnormal head and died on 11.7.1968. A female *sambhar* was also released in the swamp deer enclosure. The swamp deer showed keen interest in *sambhar* female but mating did not occur between the two due to disparity in size.

The four-horned antelope have produced young during January and February as they do in wild. The parturition period of *chinkara* or Indian gazelle in captivity in Delhi Zoo has been from June to August although there are only three births recorded of the species. In Delhi Zoological Park, the young of *sambhar* are mostly born during the month of October, November and December. Thamin and Browantlered deer have produced young mostly during October and November as in wild. It is interesting to compare the data of Delhi Zoo (Chart I) with that of Jaipur Zoo at Chart II in respect of *Chinkara* (Indian gazelle) which has given births to youngones all the year round at Jaipur zoo. The rest of breeding data of ruminants at Jaipur Zoo indicates a similar pattern of breeding of these species in captivity.

The breeding record of barking deer, *sambhar*, thamin deer, mouse deer and chinkara in Delhi Zoological Park show birth of only one fawn at a time. But birth chances of two fawns at a time are 50% in four-horned antelope, 35% in case of *nilgai*, 11% in blackbuck, 4% hog deer and 5% in axis deer (Table IV)

Table IV
Birth of Ruminantia in Delhi Zoological Park

Species	Date of parturition	Number born	Date of parturition	Number born
Browantlered Deer	1 18.10.63	1	5 27.10.66	1
	2 12.11.64	1	6 23.10.67	1
	3 1.11.65	1	7 1.11.67	1
	4 26.10.66	1	8 10.12.68	1
Total				8

(Contd.)

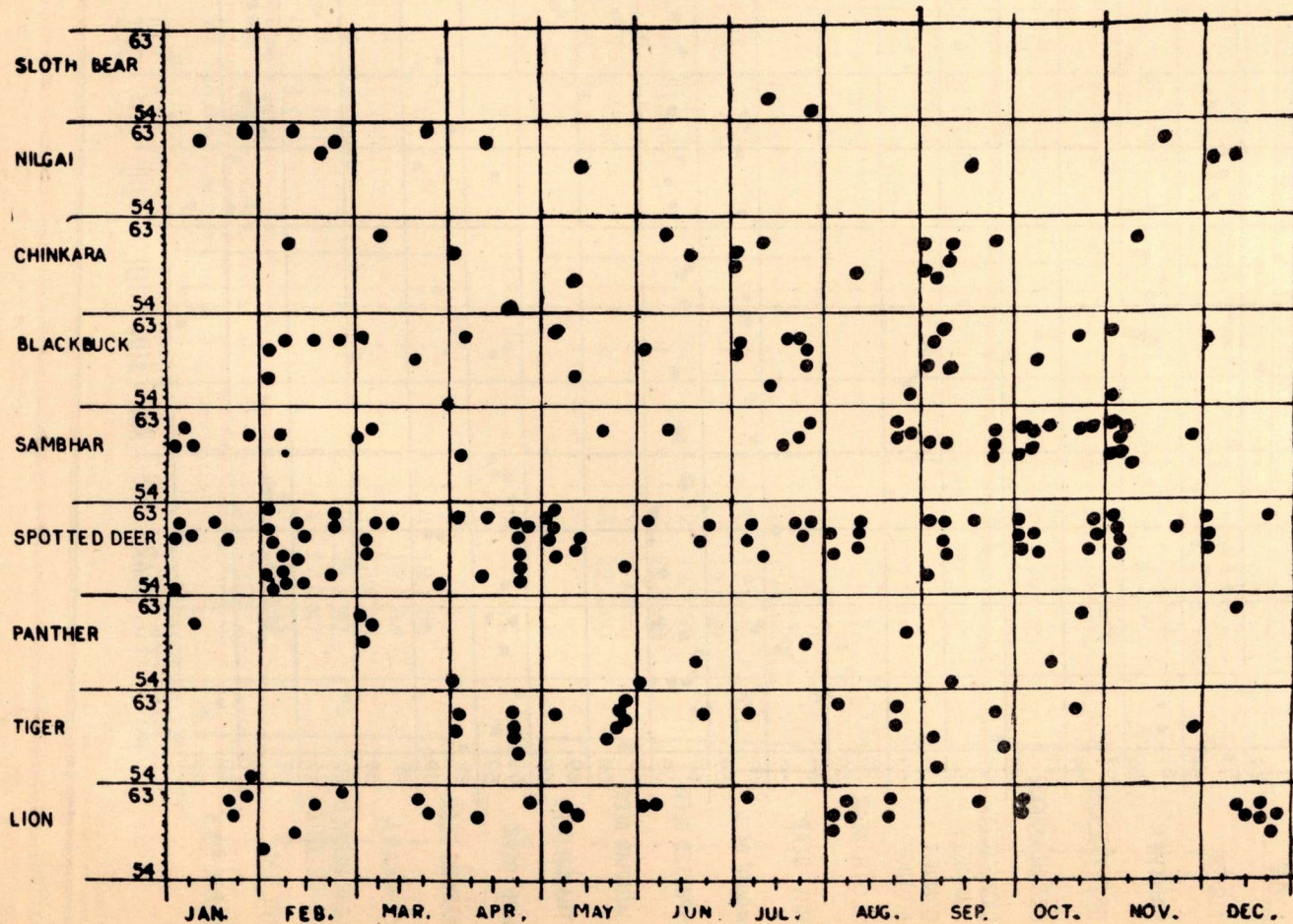
Species	Date of parturition	Number born	Date of parturition	Number born
Sambhar	1 3.1.65	1	7 10.1.67	1
	2 22.1.65	1	8 27.10.67	1
	3 27.1.65	1	9 13.11.67	1
	4 19.11.65	1	10 14.11.67	1
	5 22.10.66	1	11 5.4.67	1
	6 11.12.66	1	12 15.11.68	1
Total				12
Axis Deer	1 30.1.59	(2)	19 18.2.66	1
	2 21.2.59	1	20 16.4.66	1
	3 11 3.59	1	21 6.5.66	1
	4 26.3.59	1	22 8.8.66	1
	5 13.6.59	1	23 16.9.66	1
	6 22.12.59	1	24 24.11.66	1
	7 7.4.60	(2)	25 30.1.67	1
	8 23.2.61	1	26 20.4.67	1
	9 4.12.61	1	27 12.7.67	1
	10 12.3.63	1	28 25.8.67	1
	11 31.1.64	1	29 23.10.67	1
	12 29.11.64	1	30 17.1.68	1
	13 3.12.64	1	31 2.2.68	1
	14 6.12.64	1	32 18.4.68	1
	15 3.6.65	1	33 1.7.68	1
	16 18.8.65	1	34 8.10.68	1
	17 10.11.65	1	35 18.11.68	1
	18 7.5.66	1	36 10.2.69	1
Total				39
Twings only twice, i.e., 5%				
Hog Deer	1 27.2.63	1	13 21.4.67	1
	2 7.11.63	1	14 12.6.67	1
	3 10.1.64	1	15 24.2.68	1
	4 15.9.64	1	16 1.4.68	1
	5 3.12.64	2	17 12.4.68	1
	6 30.4.64	1	18 13.9.68	2
	7 10.9.65	1	19 1.11.68	1
	8 23.12.65	1	20 25.1.69	1
	9 13.2.66	1	21 24.4.69	1
	10 9.3.66	1	22 30.6.69	1
	11 11.6.66	1	23 7.7.69	1
	12 20.8.66	1		
Total				25

(Contd.)

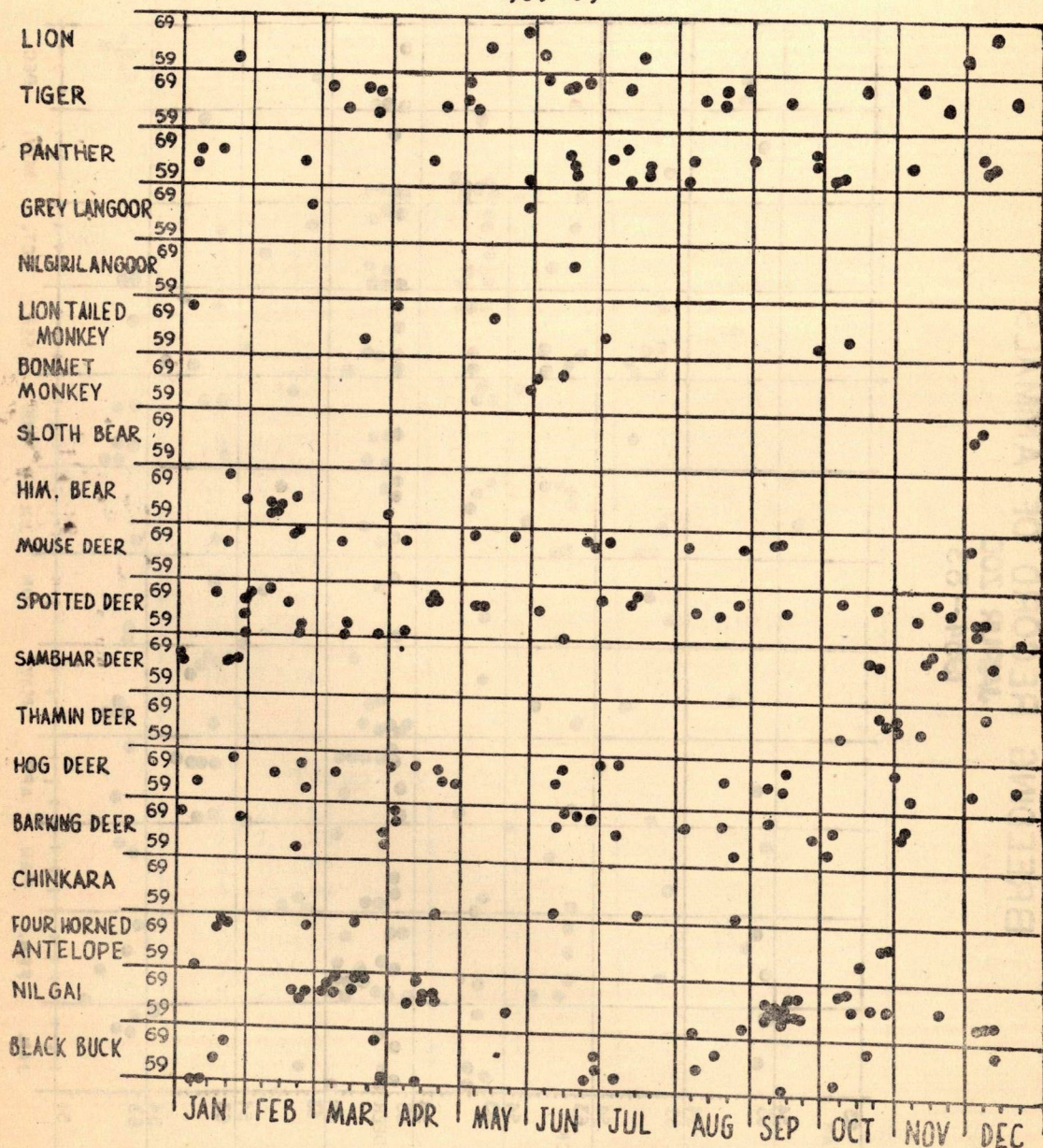
BREEDING RECORD OF ANIMALS

JAIPUR ZOO

1954 - 63



BREEDING RECORD OF ANIMALS
DELHI ZOOLOGICAL PARK
1959-69



Twins only once, i.e., 4%

Species	Date of parturition	Number born	Date of parturition	Number born
Barking Deer	1 21.2.61	1	13 4.4.67	1
	2 31.3.61	1	14 20.8.67	1
	3 24.8.61	1	15 5.11.67	1
	4 4.10.61	1	16 4.1.68	1
	5 31.3.64	1	17 26.6.68	1
	6 27.9.64	1	18 10.9.68	1
	7 5.7.65	1	19 2.4.69	1
	8 3.11.65	1	20 15.6.69	1
	9 13.6.66	1	21 21.6.69	1
	10 5.8.66	1		
	11 6.10.66	1		
	12 29.1.67	1		
Total				21
Mouse Deer	1 21.1.67	1	9 1.7.68	1
	2 9.3.67	1	10 11.9.68	1
	3 27.6.67	1	11 12.9.62	1
	4 5.8.67	1	12 19.2.69	1
	5 31.8.67	1	13 21.2.69	1
	6 2.1.67	1	14 6.5.69	1
	7 7.4.68	1	15 22.5.69	1
	8 24.6.68	1		
Total				15
Black Buck	1 8.1.59	1	10 18.1.64	1
	2 12.1.59	1	11 10.8.64	1
	3 13.4.60	1	12 28.6.66	1
	4 14.9.60	1	13 22.1.67	1
	5 31.3.61	1	14 17.8.67	1
	6 24.6.61	1	15 26.3.68	2
	7 7.10.61	1	16 21.10.68	1
	8 6.7.62	2	17 14.12.68	1
	9 28.6.63	1		
Total				19

(Contd.)

Species	Date of parturition	Number born	Date of parturition	Number born	
Twince only once i.e., 11%					
Nilgai	1	2.10.59	1	23 14.10.65	1
	2	8.8.60	2	24 21.10.55	1
	3	29.8.60	2	25 28.10.65	1
	4	9.9.61	2	26 20.11.65	1
	5	15.9.61	1	27 21.2.66	2
	6	5.12.62	2	28 27.2.66	2
	7	6.12.62	2	29 2.3.66	2
	8	7.12.62	2	30 3.3.66	2
	9	8.12.62	2	31 16.4.66	2
	10	21.5.63	2	32 17.4.66	2
	11	20.9.63	2	33 18.4.66	2
	12	21.9.63	2	34 19.4.66	1
	13	22.9.63	1	35 9.9.66	1
	14	23.2.64	2	36 16.9.66	1
	15	9.4.64	1	37 18.3.67	1
	16	13.9.64	2	38 21.9.67	1
	17	14.9.64	1	39 8.10.67	2
	18	23.2.65	2	40 9.10.67	1
	19	16.4.65	1	41 6.3.69	2
	20	21 4.65	1	42 8.3.69	1
	21	14.9.65	1	43 20.3.69	2
	22	15.9.65	1	44 21.3.69	2
				45 15.4.69	2
Total				70	
Twins 13 times, i.e., 35% births.					
Four-Horned Antelope	1	8.10.59	2	6 23.1.68	2
	2	18.10.63	1	7 27.2.68	1
	3	27.10.66	1	8 21.1.69	2
	4	28.10.66	1	9 22.1.69	2
	5	19.1.67	1	10 17.3.69	2
Total				15	
Twins 5 times, i.e., 50% births.					
Indian Gazelle	1	20.4.59	1	3 10.6.60	1
	2	26.8.59	1	4 16.7.60	1
Total				4	

(Contd.)

Interesting phenomena of foster mother relationships were observed in Nilgai. It was observed that nilgai fawns of different age groups (3, 4, 5 and 6 months) and different mothers were suckling together to a single doe. As many as five fawns of different age groups were observed suckling together to a single doe. Similar foster mother relationship were also observed by the senior author in the field (Tal Chhappar, Rajasthan) in the case of black buck in the year 1964. However, no such cases were observed in the Delhi Zoological Park

Measurements of fawns of axis deer, sambhar, Browntlered deer, barking deer, hog deer, mouse deer, nilgai black buck, four-horned antelop and Indian gazelle at birth were also taken in the Delhi Zoological Park. These records are offered here for a comparative study of measurements of fawns at birth of these species (Table V).

Table V
Birth Records of some Indian Ruminants in Captivity

S. No.	Species	Date	Sex	Weight in kg	Length in cms				Age of doe at fawning
					Total	Front foot	Tail	Ear	
1	2	3	4	5	6	7	8	9	10
1	Axis deer	31.1.64	M	3.63	77.0	30.5	17.8	8.3	3-4 years
		7.5.66	M	4.50	74.0	31.0	17.5	8.2	-do-
2	Hog deer	7.11.63	F	3.18	57.8	22.2	10.1	6.3	4-5 years
		10.1.64	F	1.81	53.04	21.6	7.6	5.7	-do-
		11.6.66	M	1.50	53.0	22.0	10.0	6.5	-do-
3	Barking deer	3.12.65	M	1.36	41.3	19.0	7.6	6.3	-do-
		12.6.66	M	2.00	52.0	19.0	7.5	6.0	2-3 years
4	Thanin deer	18.10.63	F	4.65	71.5	35.1	9.1	9.5	3-4 years
		12.11.64	F	4.54	73.7	34.3	9.1	9.5	3½ years
5	Four-horned antelop	27.10.66	M	1.20	Both the fawns were stillborn due to faulty presentation				
		28.13.66	M	0.80					
		19.1.67	F	1.250	45.0	20.0	8.0	6.0	Girth 25 cms

(Contd.)

1	2	3	4	5	6	7	8	9	10
♂	Nilgai	28.10.65 21.2.66	M F	6.85 4.75	— 84.0	— 35.5	— 22.0	— 8.5	4 years
		21.2.66	F	5.00	84.0	36.0	21.0	9.0	-do-
		27.2.66	M	6.25	86.0	38.0	21.5	8.75	-do-
		3.3.66 18.3.66	F F	7.100 5.500	— 82.0	— 38.0	— 20.0	— 9.0	4-5 years
		6.3.68	F	6.100	—	—	—	—	
7	Black buck	28.6.63	M	4.77	71.2	33.1	10.1	7.6	-do-

The sample of data is small to draw any definite conclusion but it could surmised from the available data that in general the breeding season of the animals in captivity and in wild compare favourably.

Literature Cited

- Asdell, S.A. (1946)—Patterns of mammalian reproduction. Comstock Publishing Company, Ithaca pp 314-338.
- Cheatvm, E.L. (1949)—The use of corpora lutea for determing ovulation incidence and uariations in the fertility of white-tailed deer. The Cordell Veterinarian 39 (3): 282-291.
- Cheatum, E.L. & Glen H. Morton. (1942)—Techniques used in determining the period of rut among white-tailed deer of New York State. Traus, Seventh N. Amer. Wildlife Conf.: 334-342.
- Editor. (1960)—How many young does a chital have ? J. Bem.Nat. Hist. Soc. 57 (3) : 945-947.
- Finn, Frank, (1929)—*Sterndale's mammalia of India*. Thacker Spink & Co. : 221-254.

- Jay, Phillips C. (1965)—The Common langur of North India. In Primate Behaviour (Ed. Devore I) New York : Holt, Rinehart and Winston.
- Mckenzie, Fred F., & Ralph W. Phillips. (1930)—Some observations on the estral cycle in sheep. In the procd. of the Am. Soc. of animal production, : 138-143.
- Napier J.R. & P.H. Napier. (1967)—A handbook of living primates. Academic Press, London, : 456 pp.
- Prater, S.H. (1965)—The book of Indian animals. Bom. Nat. Hist. Soc. Bombay. pp 263.
- Sankhala, K.S. (1967)—Breeding behaviour of the tiger in Rajasthan. Inter. Zoo Yearb. 7 : 133-147.
- Schaller, George B. (1967)—The deer and the tiger : University of Chicago Press, Ceigago : 370 pp.
- Shull, E.M. (1962)—Gestation period of four-horned antelope (*Tetracerus quadricornis*, Blainville). J. Bom. Nat. Hist. Soc. 59(3) : 945-947.
- Sterndale, Robert A. (1884)—Natural history of Indian mammalia. Thacker, Spink and Co. :
- Walker, Ernest, P (1964)—Mammals of the world. The John Hopkins Press, Baltimore U.S.A. Vol. I : 644 pp.
-

The Three Saddle-Backs

By

E. R. C. DAVIDAR

When my daughter finished school I promised her a treat. The form this should take occupied my mind, as I wanted it to be unique. When the time came, I announced that I would show her the "ibex", as the Nilgiri tahr is popularly but wrongly called locally. Being fond of nature, she was thrilled. Earlier, I had, in consultation with shikari 'Joe', my favourite ibex guide, decided upon the place we would take her. It was Chinna Mekerti or small Mukerti, behind Mukerti peak, the prominent nose-shaped feature along the chain of mountains on the western edge of the Nilgiri plateau. These hills can be seen silhouetted against the western horizon even from Ooty, where we live.

When Joe makes his daily trip to the circle in front of St. Stephens's church to wait for custom in the shape of hunters and fishermen, and an odd customer who is neither of these, of one who, besides being these, is something else besides; he occupies himself watching these hills. It is not as idle an occupation as it would appear to be. What Joe is looking for are signs of burning—grass fires. Whenever old coarse grass burns Joe knows fresh young grass must grow in its place after a shower of rain or two, attracting ibex, which in turn attract Joe. If burning is isolated, 'ibex' tend to congregate there when new grass springs up. Joe told me that the burning was not extensive this year and one of the few places he saw smoke rise from was from behind Mukerti, in the direction of Chinna Mukerti. That was how we chose the place for our outing.

When the appointed day came, we made an early start, getting up at 3-30 in the morning. We collected Joe on the way and drove on to the Mukerti Dam, a distance of 34 km and from there to the Mukerti game-hut, upto which the forest Department has laid a new road. We left the car at the hut and proceeded on foot along the old bridle-path skirting the lake to the top of the lake where we made tea and had breakfast, before starting the climb. To the right of us rose Mukerti Peak and to our left, the Be-Betta and we chose the valley in between and went up it steadily, until we had climbed around Mukerti. A short halt and a further half-an-hour of steady climbing brought us to ibex country.

Nilgiri tahr had roamed all over the Nilgiris at one time, but retreated towards the west as civilisation advanced. The retreat turned into a rout in the last few years as the Forest department and the State Electricity Board between them snatched away from the tahr most of its feeding grounds, the former for growing wattle and bluegum, and the latter for building hydroelectric reservoirs. Now they are confined to the cliff line along the western boundary of the plateau.



THE BLACK PANTHER WHICH TRIED TO INTERCEPT "SADDLE BACKS"



The two "Saddle Backs" who came to have a close look.

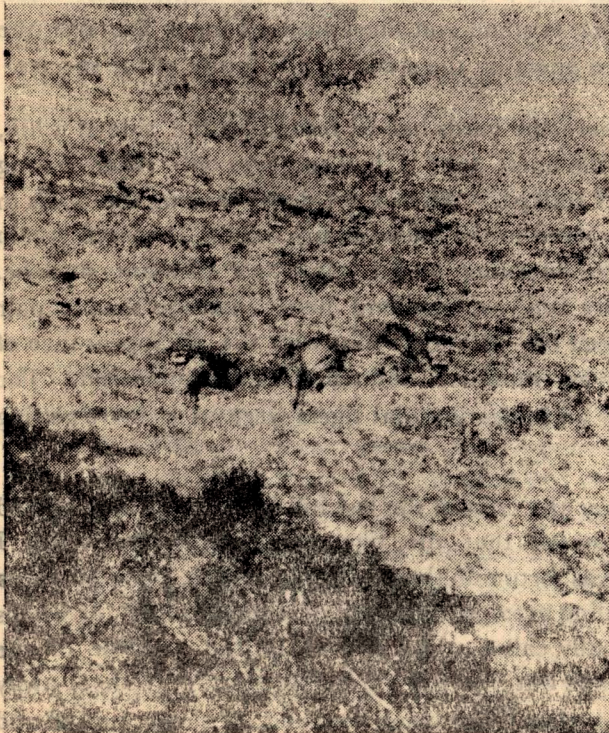


Close up of a "Saddle Back".

When we topped the rise over-looking Chinna Mukerti, the prospect that lay before us was breath-taking. The entire range of hills supporting the Nilgiri plateau on the west lay in front of us in a wide arc like the battlemented wall of a giant fortress. Above and beyond the cliff line was the undulating grass covered hills. At the foot of the hills were the forests and plains of Kerala as far as the eye could see. Chinna Mukerti itself is unimpressive; a small grass covered hill rising from a sloping triangular plateau. That day it too rose to the occasion. The plateau was like an emerald isle, being entirely covered with green, young and tender grass, leaping straight out of the sea of jungle below.

Even as we were standing there, a herd of *tahr* crossed a defile 100 yards or so below and we could see only one tahr at a time as it filed past the narrow opening. Although my daughter was quite thrilled at seeing her first ibex, she behaved like an old hand at the game and kept still. I waited until the last one, a female, which was constantly turning and looking back, disappeared from view and rushed up the hill behind which they had gone hoping to creep upon them over the hill, and meet them at close quarters. When I reached the top and looked over the hump, I was disappointed. They had passed on except for the female which brought up the rear. It was standing on the next hill, silhouetted against the skyline almost 300 yards away. It continued to stare. This made me suspect that a part of the herd

might have been left behind. So I raised myself on my elbow to take a better look at my surroundings. There about 40 yards away was a kid, perhaps, 3 months old, looking lost. I could not raise myself sufficiently to take pictures without revealing myself. So I crawled to an outcrop of rocks about 10 yards in front. And this brought me that much nearer the kid. The kid, noticing the top of my head over a rock, made straight for me thinking I was its mother, but stooped short, when it came near enough to make me out, while I hastily look pictures using both my cameras alternately. When the kid's curiosity was satisfied it ran away to join its mother.



In pursuing the *tahr* it is well to remember that the chances of success

are far greater if the stalk is carried out from above as, these animals expect their enemies to attack from below and keep a sharp look out in that direction. But since tahr prefer high ground themselves, this is more easily said than done!

Accordingly, we climbed the Chinna Mukerti and sat just below its summit to avoid being seen against the sky line and scanned the cliffs below with glasses for our quarry. We picked out a small herd making its way up the cliffs. I stalked them, but the wind changed and they made off as they got my scent.

Leaving Priya, my daughter, behind, Joe and I climbed another point and spied. I noticed Joe stiffen suddenly. He wiped the glasses and looked again and when he was satisfied, he whispered, "Sir, saddle-back".

Young male *tahr* can hardly be distinguished from the females which are brownish grey, tinged with yellow, in colour. But as it grows older, it turns darker and is then known as the "brown buck". As it advances in age it turns sepia brown and then almost black and at the same time, the hair on the middle of the back in the lumbar region turns lighter and a distinct saddle mark is formed. These old bucks are referred to as the "Saddle-backs" and at once become the object of pursuit of sportsmen, as only a saddle-back may be legitimately shot. The percentage of saddle backs among the *tahr* is small and since most of them are past the breeding stage their shooting has virtually no effect on the status or the future of the species.

I looked where Joe was pointing and there 400 yards below, resting on the side of a hill, only its back showing above the hump was the finest tahr I had set eyes on. After testing the wind and my photographic equipment, I stalked. When I got down among the folds in the hills, half way from my quarry, a tiger roared in the valley to my right. It roared again a few minutes later, this was about ten in the morning and it came as a pleasant surprise. Mukerti was a sure find for tigers upto twenty five years ago and never had less than a pair of resident tigers; upto five having been seen on occasion. But with the disappearance of most of the sambur, which were there in vast numbers, the tiger also disappeared. The presence of this tiger at Chinna Mukerti was an indication that tigers were once more getting attracted to the area.

When at the end of the stalk I crept over the crest of the last hill between us and looked there was no saddle-back. Although I feared that the tiger might have disturbed it, I continued to move forward cautiously. It was fortunate that I did so. There, some 30 yards away was the saddle-back. It was nibbling grass at the edge of a small 'shola', as woods clothing folds in the hills and valleys are locally called. As it was in the shadow of the 'shola', I crouched and waited for it to come out into the sun before starting to shoot away with my camera. As I waited, I sensed that I was being watched. I slowly turned and

looked and there hardly 15 yards behind me and staring at me were two more saddle-backs, one with a saddle as good as the first. It did not take them long to make out that I was not part of the setting and with their peculiar sneezy whistling warning cry, they were off. Thus warned, the first saddle-back also made off.

I could not take my mind off the saddle-backs and as the weather, which is the most important factor to consider in the pursuit of the tahr, continued to be clear, decided to renew my acquaintance with all of them if possible or at least some of them. This time I planned to camp out in the area. Accordingly, 3 days later I pitched my little cub tent on the southern slope of Mukerti. My idea in camping there was to avoid unnecessary exertion in getting to and from the tahr grounds and at the same time not to be too close to them to disturb them.

The very first thing we saw after climbing into the Chinna Mukerti plateau was the three saddle-backs resting in a gully. I had not anticipated the association, which I had taken to be casual, to continue and therefore it came as a surprise. As Joe and I were watching them wondering as to how we were going to approach them, when the wind changed. The moment they got our scent, they were up and away. As they were hurtling down the slope to get to the cliffs, we saw another dark animal which we assumed was a fourth saddle-back cutting across the hills 400 yards or so below to join them. When this last animal came out fully into the open we were amazed to find that it was a black panther trying to head the tahr off. The saddle-backs reached the cliffs first and the disappointed panther, after resting for a while from its exertions, entered a big shola below to try its luck at other game.

By about 11-00 A.M. ground mist from the plains below came up and covered the cliff and visibility became poor and so we returned to camp. The mist did not lift until about 5 in the evening and when it did I wandered back into the Chinna Mukerti plateau in the hope of seeing the black panther once more. Meanwhile, Joe and I went in another direction to spy for tahr. When I reached the spot from where I had seen the three saddle-backs and the black panther, we saw two of the saddle-backs making their way back to where they were that morning. But half way up, they decided to stop and feed. There was a long and narrow shola reaching out from almost the bottom of the hill to within 100 yards of where I was. The tahr were on one side of it. My plan was to reach the other side of the shola and keeping it between us, work my way to the tahr. I worked my way down and when half way to the tahr, I found that there was a large gap in the shola which one of the tahr was watching. I could not get any nearer. As I lay there, hiding behind the stump of a rhododendron tree, the sun set. I suddenly realised my predicament. I was over 3 miles from camp and had no light to guide me back, I scrambled up the hill with only one thought in mind; to get back to camp before it became too dark to see. Fortunately for me Joe had returned to camp

early and not finding me there, followed me, armed with a torch. I have never been happier seeing Joe as I was that evening, when he met me in the darkness half way from camp.

The next morning we were up and after the tahr quite early. We had to negotiate a small swamp before reaching the Chinna Mukerti plateau and the swamp is encircled by low hills. While walking through this swamp which was then dry, we saw on the hill in front a saddle-back accompanied by a brown buck. They were grazing and had not noticed us. A stream flows right across the swamp. Taking advantage of the cover provided by the shrubbery on the banks of the stream I worked my way to the hill where the two bucks were and from there keeping behind a ridge, got to a point within 30 yards of the bucks, when the wind changed direction. I looked back to see Joe's reaction. Joe who had remained behind hiding in the stream-bed was scrambling out of it—that was his way of telling me that the quarry had vanished over the skyline.

We then looked for the two saddle-backs of the previous evening. They were not there where I last saw them. When we were about to move on Joe detected a movement far below. The glasses revealed that they were the saddle-backs we were looking for.

We slid down the sharp slope and approached the animals under cover of an out crop of rocks. When we reached the rocks the quarry had disappeared below. There was a large single rock, some 70 to 80 feet high, but level with us and jutting out of the hill side. I crawled across this rock and looked around. The saddle-backs were nowhere in sight. There was only one place I had not looked and that was at the foot of my rock. It was sloping inwards and I had to crawl to the very edge to see. And there directly below me, about 20 yards away were the two saddle-backs.

Hastily I took a few pictures and then the larger of the two disappeared from view behind the rock. The other looked up and saw me; instead, surprisingly, tiring watching me, it lay down and went to sleep! For the next twenty minutes I took all the close-ups of a saddle-back I had wanted to take. It was a dream come true!

The strain of half hanging out over the rock was beginning to tell upon me and I had to withdraw to stretch myself. When I next peeped the tahr had gone.

I planned to visit the area again to keep track of this saddle-back society, but the weather changed making it impossible for me to make further observations of this unique friendship.

[We hear that Dr. George ('the Mountain Gorrilla' and 'the Deer and the Tiger') Schaller will spend October with Mr. Davidar to study the Nilgiri thar.]

Himalayan Notes

By

HARI DANG

The Ibex of Lahul—A Study in Seasonal Movements

It is not the purpose of this note to attempt even a preliminary zoography of *Capra ibex sibirica* (Pallas, 1776), which would require much more space and data than is available. I have been fortunate ever since an expedition to Lahul in 1964, to keep in touch with one particular herd of ibex in the three major tributary valleys of the Millang glacier stream, which joins the Bhaga river at the quaint little town of Jispa above Keylang on the road to the Bara Lacha pass which leads into Ladakh. I will indicate in this note some of the movements of this herd over the last five years, as observed by myself on two occasions for four weeks and two weeks respectively, as well as the observations of young climbers and trekkers who have visited this particular valley at my request each year, with my own 'shikaris'.

Though the shooting of ibex is being permitted under some form of shooting licence by the Magistrate of this district, as of the Kulu district, few sportsmen have ventured deep into the Millang valley. Only the villagers of Yorcha and Darcha have been levying a toll of the herd of ibex I first met in 1964.

The terrain is arduous, the junction of the Millang-Bhaga being the lowest point to which ibex might conceivably descend in winter snow, at nearly nine thousand feet above sea level. From here rise grass slopes, with rare copses of cypress, and juniper in the more sheltered ravines and lee-ward ridges. The valley north of Millang is a natural if rugged route across the frontiers into Ladakh, whereas the valley south of Millang is in fact utilised by a track to Khoksar, a short cut. On the high ridges between these valleys are over ten summits, M 1 to M 10, covered in snow throughout the year, all over twenty thousand feet in height. Mulkilli, which gives its name to all of them, is over twenty-one thousand feet in height. All the summits have been climbed, some by our own expedition in 1964.

It was here that we located in 1964 three groups of ibex. In March they had all gathered on the early grass slopes freed of snow because they faced south, facing the highest village of Yorcha. The villagers had counted over forty animals, of which eleven were large males, the rest younger males and females, and a dozen were kids. This large congregation broke up by the time we arrived on the scene in Summer, and we were able only to locate 27 of these forty-odd, in three groups.

These three groups were not moving together, but the composition of the groups changed. One was an all-male group of 7 large males, on the high ridge between Millang

and the northern valley, while the others were family units, one female with one or two kids, who all came together each early morning on the same inaccessible shale platform above high cliffs for security against a pair of ranging snow leopards. It was my practice each morning to start moving at 3.30 a.m. from our Base Camp at the Millang Glacier junction, and to make for a viewpoint just below the summit of MI, from where even without field glasses I could spot my quarry. With glasses, it was possible to identify them, and I did this for two weeks, in between climbing some peaks.

The daily activity cycle of the groups was remarkably regular. The group of seven bucks were the first to start moving, and I would see them sporting, sneezing occasionally, on, to my mind, perilous scree overhanging vertical cliff faces. But these proud males did not venture far up the mountain. It was the unattached or solitary female ibex which seemed to go highest up the snow, crossing the ridges always higher than the males.

The family groups would invariably be down to glacier level as the light spread over the Millang glacier and the peaks began to shine faintly in the pre-dawn. They would almost announce their presence with the rattling of stones on the moving moraines of the lower glacier, where the glacio-fluvial sands sprout the tenderest grasses. These grasses were the attraction, and the warmth of deep ravines. As the light rose, so would these groups. Nudging their young along, grazing and gazing in equal proportions, they would meander up to the grass platforms higher up the screes.

I must confess here that I 'collected' one of the large male ibex, and performed a somewhat untrained and primitive autopsy. Grass alone was discernible in the throat and gullet, but lumpy root-like plants and even some grit were found in the rumen.

In 1965, 1966, 1967 and 1968, the numbers, reported to me second-hand, were reduced, but when Pervez Merwanji visited the valleys this year in May, with my old shikaris, he found them undiminished, and unsuccessfully attempted to photograph them for 3 weeks. His report confirms the plot I had already made of their seasonal movements, as being directly related to temperature and grass-growth, snow cover and sunshine.

It would take a full volume to go into the data I have gathered in full detail, but I hope this note will serve as an introduction to other sportsmen who might encounter ibex in the Himalayas, and like to study them and to get in touch with the author to help compile the full life-history of the ibex of the Himalayas.

Feeding Habits and Diet of the Cheer Pheasant

One of the increasingly rarely encountered Himalayan pheasants, and one with a tail to match the Lady Amherst or the Swinhoe, is the 'Cheer'. I have known with great affection a number of coveys of *cheer* on Benog hill, a report of the goral of which hill I published in

CHEETAL, and have successfully used several local 'poachers' to protect them from the snares of other poachers. It was Kr. Brijendra Singh, once again, the 'expert' of Benog hill, who first introduced me to the extremely rich pheasant-life of Benog. Apart from the thirty or forty *cheer* in the various ravines and below the foot of the five major cliffs, there must be at least another forty to fifty *koklass* pheasants on the forested hillsides of Benog. I am sure, given adequate protection and publicity, this hill could become a major tourist attraction of Mussoorie. Unfortunately, till now the priority given to a ski-lift from the crowded mall to the equally thronged water-tank on the summit of Camel's Back has prevented the City Fathers from devoting enough attention to wildlife, even to bother to acknowledge my letters!

Very recently, Kr. Brijendra Singh brought to me a *cheer* pheasant from the foot of the cliff marked 5 in the article on the Goral of Benog, and I performed my third autopsy on this fascinating bird. The 'throat-sack' or 'crop', to use a lay expression for better understanding, where the *cheer* stores its diet while it is digested, came away neatly as a sack, and I counted:

22 complete acorns, minus the shells and the rough covers; 12 pairs of acorn-halves.

Nine acorns in a state of partial digestion, counted by piecing together the fragments.

Grasses, all tender, the kind that grow at five to seven thousand below boulders, under cliffs, and in moist patches, e.g., poa, etc.

Red seeds, and yellow seeds, probably grass: less than a millimetre in diameter, some two hundred or so.

Roots of some grass-like plant, tasting of ginger, slightly astringent but not unpleasant: 7 grammes.

Unidentifiable matter: 15 grammes.

Similar autopsies in the past had yielded many more seeds, a large amount of deodar and pine 'seed' or 'chilgoza', and more succulent matter. This might have been because the forests are conifer beyond Chakrata where I had collected them, whereas oak predominates on Benog, with extensive grasslands.

I feel strongly that such autopsies even though hardly scientific are most useful and should be conducted on all Himalayan wildlife to determine their feeding habits and to draw conclusions on which to base conservation measures, to encourage the growth of useful factors of the habitat.

Wildlife in the Himalayas—Threatened from Kashmir to Assam

By

HARI DANG

It is 2,500 kilometres from Nanga Parbat on the Indus, to Namcha Barwa on the Brahmaputra, but the snow leopard, and its favoured prey, the bharal and the musk deer, are to be found throughout.

Pakistan and China, including Tibet, Nepal and India, with Sikkim and Bhutan, share these rugged mountains and valleys. Within this vast span of inaccessible glaciers and cliff-rock, high pasturelands and snowfields, deep river-gorges and fantastic summits, occurs the most magnificent assemblage of fascinating wild animals and birds to be found anywhere on this planet.

The scimitar-horned mountain goat, the ibex, and the spiral-horned markhor; the agile thar and the heavy-browed trophy, *Ovis ammon hodgsoni*, or Great Tibetan Sheep; the Tibetan antelopes and gazelles, the wild ass and the wild yak, the 'Urial' and the 'Hangul' or Kashmir Stag; the dainty gorals and the serow and takin, the Giant Panda, and the red pandas so cherished by the late Mr. Nehru, the black bear and the brown bear, the colourful pheasants and the legendary 'snowman'..... the list will interest only the ecologist, but every visitor to the hills of summer would be interested to know that these animals have their habitat in the swards and pastures, the cliffs and gorges, screes and high forests of these ultimate mountains of the world.

Or was ! For the snow-covered borders of the Himalayan ranges where they sought refuge from man and warmth alike, have suddenly alive, become and their refuge is invaded by a variety of factors.

The Himalayan region forms part of the palearctic zoo-geographical realm, a temperate zone habitat with marked seasonal fluctuations of forage and temperature. These changes in snow condition and feeding range impose limitations on breeding capacities and growth-rates. Human beings as well as animals are forced to migrate or hibernate, living mostly within a narrow margin of subsistence. That they have survived to this day is a tribute to the inaccessibility of the Himalayas, and the primitive weaponry of the populace. These safeguards are now collapsing with the advent of the motorable road and the modern rifle and shotgun.

I found myself with an Indo-French expedition in Lahul in 1964, and saw my first herd of *Ovis ammon hodgsoni*, or 'Nayan', a wild sheep with immense and heavy horns, on the south side of the Bara Lacha pass. Its normal habitat is the high plateau of Ladakh and eastwards all along the northern aspects of the Himalayas, but never to south. This herd,

like thousands of Tibetan antelope and gazelle, called 'chiru' and 'goya', nayan and argali, bharal and possibly red (brown) bear, had been chased right across the difficult border country into the Indian Himalayas by Chinese troops and their depredations. Their shelter in India was, of course, short-lived, for the greed for furs and musk, exportable for lucrative dollar-sales, had spread right after the Second World War, and became a regulated racket after Independence. Snow leopard and musk deer, bharal and thar and *Ovis ammon*, markhor and Kashmir Stag, goral and serow and takin, and all the Himalayan family of animals, have been the worst sufferers, and even I, after seventeen years spent in pursuit of trophies and later of pictures and facts, cannot say with assurance just how many of each are left.

The I.U.C.N. produces a running-log of endangered species called the Red Data Book, but even there only markhor and panda, Kashmir Stag and pigmy hog, wild yak and wild ass, find a place as 'endangered species'. Perhaps, their failure to accord priority to Himalayan work has been the result of their sources of information being mainly Europeans who now-a-days have limited access to Himalayan wildlife. In fact, this neglect of the problems and dangers of Himalayan wildlife bodes ill for this vast terra incognita of the ecologist, where all species are threatened with eventual extinction, unless surveys can be conducted urgently, and a network of sanctuaries established, supplemented by measures of enforcement of game rules and shooting seasons.

In Ladakh and NEFA, we ourselves are the guilty men. Our forces have decimated the vast herds of wild ass and nayan, chiru and goya, ibex and urial without even knowing what we shot. Readers of Kipling's classic, 'Kim' would recall the tradition of Himalayan 'shikar'..... sahibs' on long leave strenuously stalking the wily ibex, hunting the shy snow leopard, red bear and trophy heads of the other species. But they generally did so in the shooting season, and very often excellent books resulted, as by Count Apponyi, Stockley, Houghton, and Markham. Leaving aside the villager who shoots for meat or money, our own 'brown sahibs, have been disappointing: the taxidermists' shops I visit regularly generally receive trophies from NEFA and Ladakh, and I have seen rare heads of takin and serow, nayan and argali, urial and ibex, listed in their letters as goats and sheep indiscriminately. One particular officer from NEFA sent in a dozen brace of pheasants, tragopans, rare kalij races, and possibly the remains of an eared-pheasant, all lumped together as 'murgais' which he wanted to have mounted !

All this carnage is a far cry from the poetry and the passion of the pioneers of the Himalayas, from.....

.....that windy rift,

Where the baffling mountain eddies chop and change,

Do you know the long day's patience,

Belly down on frozen drift, while the

Head of heads is feeding just out of range ?

It is there that I am going,
 With a trusty nimble tracker that I know,
 For I have sworn an oath on the horns of Ovis poli.....
 And the red gods call me out, and I must go !

But such was the poetry of the mountains and their fauna that I was brought up on, and feel doubly hurt to see the damage done and continuing, or when ecologists armed with rich grants scoff at us resource-less Indians for being towns-people, a race of plainsmen

The massacre continues. The great herds in Ladakh have either been wiped out, or do not permit jeep-loads of troops to approach close enough. Tso Moriri lakes area north of Spiti has been depleted, but this No Man's Land still guards its herds, and all over the mountains, the third phase of destruction is beginning. This is the crucial phase of winter-shooting, when animals like the thar, serow and takin, seek refuge in forest when snow lies deep on their pastures. One winter we found ourselves with our 'bhotia' friend, and poacher of musk, 'K.S.' near Mansiari recently. Snow lay ten feet deep on Kala Muni above the villages, and a party of villagers armed with nothing more than stout poles and one muzzle-loading shotgun, trailed a herd of thar through the heavy going. The thar headed downhill, ploughing a wake, which the villagers followed easily, to come upon the thirteen beasts in a clearing. Panting and exhausted, they could hardly move as the 'bhotias' fell upon them and finished the whole herd off with staves, without using the gun. Such massacres are daily routine in the high Himalayas during winter. And no number of sanctuaries can save Himalayan fauna, for once below the crucial level, these temperate breeding species cannot survive. Musk deer, for example, are pair-bonding for the season. If adjacent valleys do not contain a potential mate, breeding will cease, for musk love their own valleys where they were born. Similarly, the chances of a male and female snow leopard meeting each other are reduced to below feasible if their numbers come below a certain level.

It is not by Himalayan sanctuaries, and these are few, that we will save Himalayan wildlife, but by conservation of the entire habitat to permit breeding to continue. This necessitates a well-planned National or concerted network of sanctuaries, rather than a state-initiated and arbitrary 'paper'-declaration. Such State-planned sanctuaries and National Parks can save peninsular wildlife, but not that of the mountains of the north. Between these systematically selected and planned sanctuaries, determined on a species-wise consideration based on forage and breeding capacities, must be vast areas of conserved and controlled 'permit-shooting', and not indiscriminate 'clearing out' of vast areas which confines the rare and slow-breeding species to islands where their breeding potential is reduced to a slender margin of survival liable to make them extinct in twenty years from now.

Of genuine and effective sanctuaries in the Himalayas, there are too few, though the simple criterion of numbers gives us thirty-six in Himachal Pradesh alone ! Thirty-six, and I quote the official figures !

Of authentic man-made Himalayan reserves, the Kalabagh Wildlife Reserve in the Salt Range of Pakistan, was recently opened with World Wildlife Fund help. It has given protection to the last surviving herd of the Punjab race of the urial, *Ovis orientalis punjabensis*, now numbering 500. The urial in Ladakh and Swat, Tibet and Tso Morari, still have to rely on their traditional protectors, the inaccessible, inhospitable terrain, and the religious protection afforded by Buddhist ritual.

In Kashmir, the Dachigam Sanctuary has given some kind of protection to decreasing numbers of Kashmir Stag. The late Major Shashi Dang, and the late E.P. Gee were among the first to study this 'hangul' population since Independence, and now the I.U.C.N. is showing interest in an ecological survey of Dachigam. This sanctuary, since it has the added benefit of easy access from Harwan near Srinagar, could well become a really first class tourist-attraction, and could definitely save the hangul, as well as numbers of thar and bear.

The water-catchment areas of Diankund near Dalhousie, and Kufri near Simla are two fairly effective sanctuaries in Himachal, the latter the site for the first well-planned Himalayan Zoological Gardens. Here are found thar and black bear, goral and pheasant and serow. But Himachal needs to effectivise several others of its sanctuaries which today exist only on paper. The few herds of markhor in the Pir Panjal, including the Kashmir herds in the Kishan Ganga valley, need to be preserved in sanctuaries, as also the population of Kashmir Stag near Kishtwar and Pangi. *Ovis ammon* and ibex in Padar, Lahul, Spiti and Kinner need certain sanctified areas. Col. Nedon, the eminent sporting conservationist tells me that the markhor in Kashmir are holding their own.

In Uttar Pradesh are found the two most genuine sanctuaries: The Nanda Devi Sanctuary, by virtue of its natural barriers to poachers, and the Har-ki-Dun Sanctuary, well-patrolled and guarded if only in the essential valleys of the Tons and Yamaduar rivers. These need to be developed into truly credible tourist attractions, where visitors would be able to see bharal and musk, red bear and snow leopard, and many other species, at feed and play.

I have spent many months in these two areas, and made recommendations to the administrations concerned. It is good to know that the U.P. Forest Department is taking keen interest in their development. Dodi Tal, another accessible valley near Uttarkashi, used to be protected, but is now open to shooting by permits. Some form of protection to the immediate vicinity of Dodi Tal would help, though the surrounding country, soon to be opened up by a motorable road, should be open to permit-shooting.

Nepal has several areas where wildlife is preserved by the populace themselves. One such, the Thyangboche Monastery areas below Mount Everest, is still abundant in musk deer and thar, snow leopard and Blood Pheasant. Such areas in Nepal should be given legal

protection, before religion gradually loses its hold on people. Thyangboche is now becoming a tourist attraction and the Japanese are building a hotel here.

Bhutan's King has taken a lead in declaring the Laya area in the north-west a high elevation sanctuary, and we hope to survey this area next autumn. This could well be the most suitable preserve for takin and snow leopard in that country.

Similarly, the Luhit valley in NEFA has a nominal sanctuary which the Explorer's Club of Calcutta plans to visit. More information is needed on the NEFA areas before valid conclusions can be drawn.

But even if all these endangered and rare species are given effective protection in these essential areas mentioned, they will continue to decline, unless these sanctuaries are connected by hinterlands or 'gaps' having *some* if not plentiful representatives. Sanctuaries separated by 'wildlife deserts' in the plains of India can flourish, but in the Himalayas, where breeding factors are so complex, they will gradually prove to be leaking baskets !

The ultimate solution to the problem lies in the controlling of *all* shooting all over the Himalayas. Valleys like Milam and Badrinath, Dhaulī and Sutelj, where the erstwhile herds of bharal and ibex have been wiped out, will remain unbridgeable barriers to the spread and survival of the species. It is with the local populations and their foresters and administrators that the fate of Himalayan Wildlife lies. Ultimately, it is their discrimination which will save this finest wildlife family in the world.

Interim measures, sanctuaries for protecting threatened species, the catching and development of breeding stocks in high-elevation zoos to prevent immediate extinction, are necessary, and must follow upon a comprehensive study of the Wildlife of the Himalayas.

Perhaps I am carried away by my enthusiasm for these birds and animals which have accompanied my youthful adventures and climbs in the mountains of my birthright. To me they remain far more valuable than a mere tourist asset, far more fascinating than ecological problems and legends and mysteries still unsolved, where I might make a name by naming a new animal; far more precious than a field of study. If others come and study and save our Himalayan animals neatly in sanctuaries, and climb our mountains for us, to me it would be only slightly better than extinction, for the Himalayan have a destiny for India. To awaken us from our torpor, to goad our youth from their dreams of restlessness and their sloughs of indifference and indolence. It is to wake us all to our birthright, to a new Faith in ourselves, a Faith easiest, and to some, only, found in the Himalayan snow-peaks and pleasant pastures where the snow leopard and the red bear roam.

The Endangered Crocodiles of India

BY

R.N. MISRA

SUMMARY

The author observed and studied crocodiles in North India. The two species studied i.e., *C. palustris* or Muggar and *Gavialis gangeticus* or Ghariyal face extinction because of poor enforcement of hunting rules, highly profitable foreign trade in skins, loss of habitat and food resources, etc. The two species of crocodiles studied are similar in colour and habits but vary in size, habitat and anatomy. Their breeding and feeding habits are similar but the Ghariyal or *Gavialis gangeticus* prefers deep waters and lonely places.

Both feed on almost any living or dead creature by swallowing it entire. When they take to attacking domestic animals and human beings they start frequenting fords and lie in wait for the quarry.

A number of methods are utilised for hunting crocodiles. They may be netted in strong nets, hooked with metal lines and strong fishing hooks, shot with a rifle, noosed and dragged out of the river and killed when they are tempted to swallow a goat skin stuffed with quick lime or shot at night by the aid of a strong flashlight.

The present status is that their existence is endangered and immediate steps need to be taken to preserve them.

Recommended steps for conservation are:—

- (a) prohibition of export of skin or any other part of a crocodile
- (b) hunting and shooting to be prohibited for ten years.
- (c) game laws to be more rigorously enforced by some agency outside the Government forests.
- (d) a survey should be undertaken to study the present status of *Gavialis gangeticus*.
- (e) preservation of breeding stock and starting of Crocodile farms should be encouraged.

Four decades of observation and contact with the wildlife of India gave me opportunity to observe crocodiles in North India, the land of the Ganges and its tributaries, where waters once teemed with crocodiles and it was usual to sight several groups basking in the sun even if one travelled for a few hours on a bullock-cart along the bank of a river. Localities previously visited have been revisited in the last two years and the experience gained forms the basis of this paper.

Wildlife outside the Government Forests has been sadly neglected and endangered mainly because of commercial exploitation for meat, skin, fur and feather. Crocodiles used to be

found mainly outside Government forests, in rivers and ponds. In all such areas there was and is hardly any enforcement of well intentioned legal measures. Diminishing food resources and destruction of habitat are other important causes of diminishing numbers.

Of the twenty-three species of crocodiles the author has seen three in India and has closely observed two of them. The three species found in India are, *C. porosus*, the estuarian crocodile abounding in Sunderbans of Bengal; *C. palustris*, commonly known as the Muggar or NAKA, and *Gavialis gangeticus* or the Ghariyal.

Little has been written and less is known about the Indian crocodiles because they live under water and surface when feeding or when they come ashore to bask in the sun or when the air is warmer than the water because of their immense liking for heat. When floating they look like logs of wood, often remaining submerged with only their eyes showing out of the water. If it is a Ghariyal (*Gavialis gangeticus*) the lump on the snout also shows up. They are extremely shy and on the slightest suspicion of close approach or sight of man slide into the water from the bank where they may be basking.

C. porosus has acquired the reputation of being a man eater, frequenting the estuarian waters of the Bay of Bengal, and as such few champion their protection.

DESCRIPTION

C. palustris—the common Muggar or Naka has dark olive brown upper parts and the lower parts are pale yellow. The young ones are pale with some black spots. The average length is ten to twelve feet but specimens of eighteen feet or more may be obtained. The snout is short and broad and the conformation barely suggests a triangular outline. It has also been described as the snub nosed crocodile. The top of the head is rough with ridges. It can walk and run on all fours. The fingers are webbed at the base and the outer toe broadly webbed and the outer edge of the hind limb is turned into a serrated fringe. They may be seen at some places even now, basking on sandy river banks in groups of twenty or more. Males and females cannot be distinguished as they lie basking.

Gavialis gangeticus or the Ghariyal is also dark olive brown above and pale below. The young ones are pale brown and grow darker with age. The snout is long and slender, extending from the head like the handle of a frying pan. It is known as the Ghariyal because of the round pitcher like protruberance forming the nose at the end of the snout. It is far more pronounced in case of the male and so the sex can be determined from a distance. The nose very much swollen can be inflated like a bag when nostrils are closed. The female is known as "Goh" and outnumbers males. They are often found basking on river banks in company with *C. palustris* or Muggar. Larger males are seen as solitary monsters basking on river islands with deep waters all around and where the current is not fast but far from the approach of man.

The hide of both the Muggar and the Ghariyal is highly prized because of the pattern of squares on it. The squares on the Ghariyal are smaller even though the specimen may achieve above the average length. The hide is used for making strong fancy articles from cabin trunks to ladies bags and shoes.

HABITAT

C. palustris or the Muggar is found all over India in rivers, lakes, tanks ponds, and marshes. Sometimes even a few miles from the nearest river or large tank. During the monsoon floods, rivers, lakes and ponds all become one continuous sheet of muddy water in most low lying areas where the width of water may even be twenty or more miles. The Muggars in the rivers reach tanks and ponds and the receding waters often leave them there. When the smaller tanks and ponds dry up in winter and summer they are often found buried in mud or making overland journeys to rivers or bigger tanks, usually when it is dark. It is also found in waters in the forests where it lies basking or waiting for its prey to come near enough for an attack. They may be seen in the exposed roots of trees on stream banks due to erosion. It lives in deep pools of rivers where the current is sluggish and enters holes and caves under water or just above water level on the steep banks. They multiply to large numbers in sacred lakes and ponds like PUSHKAR in Rajasthan till they become a nuisance and need removal to ensure safety of bathers in the sacred waters.

Gavialis gangeticus or the Ghariyal is mainly found in the Ganges and its tributaries in north India but a few specimens have been recorded from Mahanadi in "Saptikoshi" area of Orissa and according to a knowledgeable person in the river Sutlej also. They are usually found in the deeper pools of rivers and not in shallow tanks and village ponds.

SIZE

C. palustris or the Muggar attains a length of more than eighteen feet but the average now found is only about twelve feet. The length of a crocodile is often noticed to be five to six times its head but in larger specimens, the length, calculated according to this formula would be more than thirty feet which has not been recorded. When hatched they are small but grow fast, approximately a foot a year for the first five or six years after which the growth is slow and said to be only an inch a year, which means that a twenty foot crocodile would be more than two hundred years old. This needs careful checking under controlled conditions. The *Gavialis gangeticus* attains a length of more than thirty feet but the largest the author measured was only twenty-two feet and two inches.

HABITS

Little is known about the breeding habits of *C. palustris* the Muggar and the *Gavialis gangeticus* or Ghariyal. Both lay eggs in sand pits not far from the waters edge and cover them with sand with the help of their tails. The female remains in the pool nearby but the

eggs hatch by the heat of the sun. Twenty to forty eggs are laid at a time and it is not difficult to find them because of the tracks left by the crocodile. The eggs are hard, white and elongated. The eggs are laid after the monsoon rains are over. The young ones are noticed on the shallow banks from February to May. They also bask in the sun in company of the grown up ones. The male Ghariyal or *Gavialis gangeticus* is sometimes seen chasing the female in the water and at that time there is such splashing in the water.

FOOD AND FEEDING

The Muggar or *C. palustris* feeds on almost any living or dead creature it can find on the water or on the ground nearby. The young ones start feeding on insects and small fish and take to bigger fish as they grow up. It can run at considerable speed on all fours with the great body raised well above the ground to catch its prey in the jaws and drag it quickly in to the water. It can take a leisurely walk also when it travels in search of rivers or bigger tanks when the smaller ones start drying up. This is done mainly in the dark. How they find their way is a mystery as none have been recorded as going in the wrong direction and being found in day time on the ground far from water, though sometimes found buried in the mud of drying and dried up tanks and ponds.

The author has on several occasions seen goats and sheep grazing near the bank attacked all of a sudden by an apparently sleeping crocodile who failed to notice even the presence of men on the opposite bank. They take to attacking domestic animals and sometimes even drag cows into the river. Hindu mythology has story of a crocodile dragging an elephant by the four foot as the elephant was drinking water on the river bank till only the tip of the Tunk was outside the water when super natural powers intervened to save the elephant. Sometimes wild deer swimming across are caught and dragged under water. Driven by hunger a crocodile starts frequenting fording places to catch domestic live stock and sometimes men who cross over by walking or swimming. It is then that terror spreads round country side as the crocodile ranges for miles up and down the river frequenting many fords. At threatened fords groups of men thrash the water with sticks to frighten and drive away the lurking crocodile before they cross the river. None of the two species are man-eaters in the sense tigers and panthers are, because they do not stalk men and kill them and often a real man-eating tiger or panther refuses to kill other animals unless it is driven to do so by hunger. The crocodiles lie in wait at crossing places for their prey and surface the water to have a better view of animals crossing the river. The view outside the water is better than from inside the water. They do not show any preference for men, though they start by taking dead bodies floating down the rivers. Crocodiles usually feed in the morning and evenings.

The Ghariyal or *Gavialis gangeticus* is reputed to be a fish eater but like the Muggar or *C. palustris* it also eats any thing dead or alive. The author has examined the stomach

contents of scores of dead crocodiles and often found pebbles and stones weighing from two ounces to two pounds. Bones, animal and human, were also found. Sometimes metal and silver ornaments worn by village women were also found, proving that they swallowed human bodies. A Ghariyal or *Gavialis gangeticus* is feared more than the Muggar probably because of its size.

HUNTING

The crocodiles appear to take floating baits and not those that sink. An attempt to hook a crocodile in a strong hook and fishing line failed when a piece of meat was attached because it sank. The same experiment was repeated with goat lungs attached which kept floating and attracted the crocodile in no time.

Crocodiles can be netted also but the bigger ones tear the net and escape. Ingenious are the ways of crocodile hunters. One method used is to stuff the wet skin of freshly killed goat with quick lime and sew it up. As it is noticed surfacing the skin is floated down the river and the hungry crocodile swallows it. On mixing with water the quicklime reacts and the crocodile dies a painful death. In shooting crocodiles with rifles the brain and neck shots are fatal but it has to be anchored by breaking the spine at two places otherwise it enters water and may sink to the bottom to die and float up after a few days and may be retrieved far down the river. When shot at and wounded it sometimes enters water and goes up and down the river as the blood in the wound flows out and the fish and turtles smell and taste it. They nibble at the open wound and the crocodile rushes out of the waters only to be followed by the turtles at whom he snaps and sometimes succeeds in cracking the shell of one of them. The crocodile goes back to the river only to be attacked by fishes and turtles till death.

Professional crocodile catchers scour the rivers in small boats and when they reach pools frequented by crocodiles, the boat is anchored. One end of a strong rope is securely tied to a peg driven on the ground and the hunter dives into the pool with the other end of the rope in his hand. He reaches the crocodile at the bottom and ties a noose round the belly and then the crocodile is dragged ashore. Why the crocodile does not attack the man with the rope remains a mystery. These hunters eat the meat of the crocodile.

Crocodiles can be shot at night from a boat by the aid of a flash light thrown on the surface of the water. The eyes of the crocodiles reflect light and shine a dull red and it is not difficult to take a brain shot after which it floats up. The eyes of a Ghariyal or *Gavialis gangeticus* reflect light only from certain angles and so they are not shot at night.

Crocodiles are normally shy and inquisitive and in waters where boats are not known they may follow a boat on either side to the fright of the occupants but at the same time they do not over turn the boat.

PRESENT STATUS

In North India large groups of 30 to 60 crocodiles basking on sandy banks and rocks have become a rare sight and now groups of 10 to 20 may be seen at favourite spots which often change with every monsoon flood when new deep pools may be formed. In South India the position is said to be far worse. In Orissa the position is desperate. On the Indo-Nepal border the rivers and streams still have large numbers of crocodiles because of better enforcement of laws.

Man is the main predator for crocodiles, though the very young ones have many enemies and survival is only six or more from 20 to 30 eggs. Trade, specially foreign trade and the high prices offered in foreign exchange resulting in a wavering export policy is the main cause of declining numbers. Diversion of river waters into canals also reduces the habitat and effects the status of *Gavialis gangeticus*. Intensive fishing in the rivers and the favourite pools of the crocodiles reduces the food supply resulting in diminished numbers surviving.

SUGGESTION FOR CONSERVATION

Development of large scale commercial fisheries should be undertaken. Export of skin in any fish should be prohibited or drastically reduced. The general procedure is that orders already registered and skins in stock may be allowed to be exported and this results skins being added to the stock. Shooting crocodiles except of those that endanger human life should be prohibited for next ten years. Special care should be taken to enforce game laws specially in areas outside the forests where crocodiles are found. Netting and catching should be prohibited. A survey of the present numbers, specially of *Gavialis gangeticus* should be undertaken to judge its present status.

The Indian Board of Wild Life is taking interest in preserving crocodiles and it features on the agenda of the Board meetings.

The possibility of starting crocodile farms has to be investigated.

HORILICKS

GIVES
YOU
EXTRA
ENERGY !

Hindustan Milkfood Manufacturers Ltd.

NABHA (Punjab)

With the Best Compliments of



TELEFUNKEN INDIA LIMITED

G-4, South Extension, Part I

NEW DELHI—49.

INDIA

World's

Finest

Holiday

CHUGH TRAVEL

INDIA'S FINEST SERVICE

NEW DELHI, DEHRA DUN, LUCKNOW, KANPUR, JULLUNDUR

IATA - ASTA - PATA

H.O. RECOGNIZED BY THE GOVT. OF INDIA

WATCHES ARE ELECTRONICALLY
TESTED AND REPAIRED WITH
LATEST SWISS

VIBROGRAF

Accuracy upto Seconds

BRIJ BROS.

WATCH MAKERS

1-A, Connaught Place

NEW-DELHI

Phone : 44911

5, Ganga Ram Bldg.
Ajmal Khan Road,
Karol Bagh.
NEW-DELHI-5
Phone : 563857

WITH BEST COMPLIMENTS

From

M/s Raghumal Nahar Singh

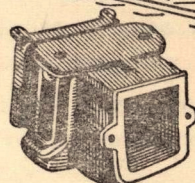
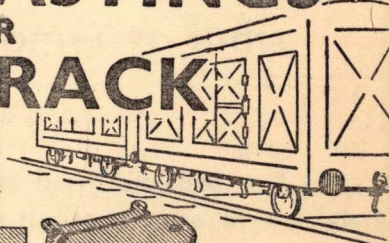
Raja's Road, Dehra Dun.

Phone: 3562

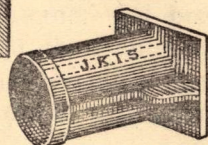
DEALERS IN :

Iron, Steel, Cement, Hardware, Paints,
Asbestos Sheet, & all Building Materials.

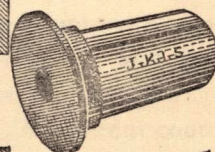
CASTINGS FOR TRACK



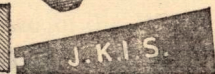
AXLE BOX



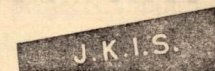
BUFFER CASING



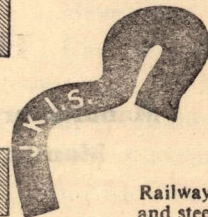
BUFFER
PLUNGER



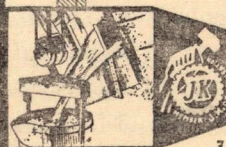
COTTER (SPLIT)



COTTER (BENT)



RAIL ANCHOR



Railway Track materials and steel castings of all sizes upto 4 tonnes a piece are produced by modern methods, controlled at each stage of production out of steel from our Electric Furnace.

J.K.I.S. steel gears the Railways

J. K. Iron & Steel Co. Ltd.,

REGD. OFFICE : KAMLA TOWER, KANPUR.

WITH COMPLIMENTS

f
r
o
m

STAR PAPER MILLS LIMITED

Managing Agents:

BAJORIA & CO,

**Manufacturers of Writing, Printing, M.G. Kraft,
Manila, Poster and Sulphite Papers, etc.**

Head Office:

**27, Brabourne Road,
Calcutta-I.**

Mills:

**SAHARANPUR,
(U.P.)**

The World Wild Life Fund comes to India

By

ANNE WRIGHT

The World Wild Life Fund Indian National Appeal has been launched and is to be inaugurated by the Prime Minister in November in Delhi, at the same time as the International Union of the Conservation of Nature will hold their General Assembly.

The arrival of the WWF, India, is long overdue in a country where we have without doubt the most valuable collection of wild animals set in some of the most beautiful country in the world.

The extermination of wildlife has become a serious international problem. Several international bodies and conferences had taken up the cause of threatened species and our deteriorating environment in different parts of the world, but it was not until 1961 that the WWF co-ordinated this effort on a worldwide basis. The WWF has its headquarters in Switzerland which is controlled by a board of international trustees with HRH The Prince of the Netherlands as President, and international projects are examined by the scientific staff of the IUCN, which is supported by the United Nations, UNESCO, and F.A.O. National Appeals have been established in more than twelve countries, and in the first six years of its existence 183 conservation projects were started in more than 58 different countries. A terrific awakening occurred in the countries concerned and this is shown in the WWF world reports, which record fantastic achievements especially in the last two years. The 1968 Annual Report for the most successful WWF year to date showed 84 different projects, including 52 new ones, with overall project grants for the first time over the million dollar mark.

It is impossible here to enumerate the lasting conservation achievements realized by the WWF, but to name just a few. The establishment of the Nature Reserve LANGE LACKE in Austria, the purchase with some help from the Spanish Government of 16,000 acres in order to establish the CORTO DONANO Nature Reserve in Spain (probably Europe's most important nature reserve, where thousands of wild fowl have a breeding ground, and where the rare imperial eagle and the Spanish Lynx have a refuge). In Africa the WWF achievement includes the building of the Englehard Dam in the Kruger National Park, and the enlargement of the Milwane Game Sanctuary in Swaziland. A Biological Research Station was built in the Ujung Kulon Nature Reserve, Indonesia, for the study of the very rare Javanese rhinoceros, in Japan a Preservation Centre was completed for the Crested Ibis, and a sanctuary was created in Guatemala. Land was purchased for several sanctuaries in the USA, and important sanctuaries in Equador, famous for their very rare Mountain Tapir, and in Peru, were established.

The Indian National Appeal has opened an office in Bombay, at the Bombay Natural History Society with a board of eight Trustees, including His Highness Fatehsinghrao Gaekwad of Baroda, who is an International Trustee, and Mr. Zafar Futehally who is the Hony. Secretary.

The Indian National Appeal is a challenge to the nation. The first to rally to its support was the Great House of Tata, followed by I.C.I. It is through these contributions to the WWF that a service will be done for mankind by those whose long term aims are for wealth and happiness and who wish to conserve for future generations the natural world around us and to guard our national heritage. A Director of I.C.I. wrote pointedly. He said "There is no shortage of material problems in India and these have to be tackled, but if during the course of coping with them the countryside is not protected the end point can only be disastrous as there is no going back and you never get a second chance."

At a recent meeting of the Trustees the first project to be started will be for our rarest bird, the Great Indian Bustard, of which very few survive in Gujarat and Rajasthan. A pamphlet published in the language of the different regions will be distributed in the villages immediately, and after a scientific study a sanctuary will be set up. Other projects to be supported are the study of the reasons for the decline in the populations of the Gir lion, the greatly endangered and only surviving herd of Barasingha (Branderi) in Madhya Pradesh and the white winged wood duck of Assam.

More than seventy kinds of animals and birds have become extinct during the present century and there are now more than a thousand species in danger, many of these inhabit the Indian sub-continent. Apart from the help from our industrialists the WWF Indian National Appeal will rely on private individuals to come forward with financial aid for the great work which lies ahead.

WORLD WILD LIFE FUND, Morges (Switzerland)

This is the Symbol of the World Wild Life Fund



A Giant Panda (Ailurpoda melanoleuca) has been chosen to symbolise the work of the Fund because it is one of the best-known and best-loved rare animals in the world, and because it owes its survival to the sort of careful conservation which all wild creatures deserve.

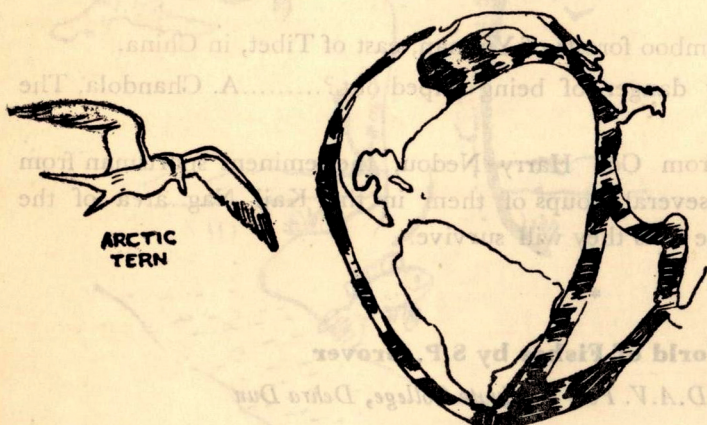
Students' Corner:

Letter from Peter Lunn, Poona:

"Watch the geese through "Binoculars" and see how they fly with the wing facing the inside of the "V" comparatively in a state of rest. Yet the lead bird or leading bird uses



: Geese :



ARCTIC
TERN

both wings. Then think of the Arctic tern which flies right around the world all by sea, sometimes thousands of miles away from any land. On the great oceans they fly 10,000 miles, so fragile a bird and yet so strong. Duck migrate at a speed of 50 to 60 miles an hour."

He, like so many of our student members, would like to know how he can develop his extremely knowledgeable interest in wildlife study and conservation, and what he can do to help the Society and India's wildlife. Our view is that it is young men like him who should take to the forest service of India, and specialise in wildlife ecology.

Now that we have started a separate Branch at the F.R.I., thanks to the initiative of the Forest Departments and the Inspector General of Forests, opportunities for useful work in this field will increase and lie open to you !.....Ed.

ANSWER MAN

Question:—I am fourteen years old, studying in a government school here. I want to make wildlife my profession. I will try to join the forest service, but if I cannot, because the competition is intense, can I still join the wildlife departments ?

How can we at this school start a club like the boys of the Doon School have done, when our staff are not at all interested ?.....Asoka Ranga, Hyderabad.

Answer:— I would suggest you go and call on the nearest forest officer, after getting together a group of boys, and I am sure they will help you.....Ed.

Question:— I am over twenty, and everyone tells me I must marry. Being from an army background, I suppose I will have to marry an army officer, but I want to continue keeping pets. I have a squirrel, a covey of partridge and a quail. Is there no way I can develop my interest? I am a girl, of course!.....Neelima Singh, Ferozepur.

Answer:— We suggest you get in touch with other ladies, possibly members of the Society, who have similar interest. And not only continue to keep pets, but start keeping and breeding rare birds and animals if you can afford it. And why marry an army officer? We feel forest officers make excellent husbands!.....Ed.

Question:— What are the various endangered animals of India?..... P. Kakkar, New Delhi.

Answer:— Please look up the Editorial Notes.

Question:— What is the Giant Panda, the emblem of the World Wildlife Fund?.....K. Katju, Dehra Dun.

Answer:— It is a bear found in the bamboo forests of Yunnan, east of Tibet, in China.

Question:— Are the markhor in any danger of being wiped out?.....A. Chandola, The Doon School.

Answer:— They are, but we hear from Col. Harry Nedou, the eminent sportsman from Kashmir, that he has seen several groups of them in the Kaji Nag area of the Kishanganga valley, and he feels they will survive.

*

*

*

Strange World of Fishes by S.P. Grover

Lecturer in Zoology, D.A.V. Post Graduate College, Dehra Dun

One will have to dive deeper beneath the surface of water, to probe thoroughly into a bizarre and fascinating world of fishes. The world of fishes is strange.

Fishes live in an astonishing variety of habitats: from the perpetual night of the abyss to the lighted surface spaces of the oceans. They are found along wave-battered rocky shores and coral reefs, in sandy bays and muddy estuaries, and in the mid-depths of the oceans, where there is no bottom, no surface, no shore. They are to be found in great rivers and vast lakes, in rushing torrents and still canals, in stagnant ponds and farm ditches and in caves and abysses. They live happily beneath the pack ice of polar seas and in the tropical swamps. They are to be found in the hot springs of Arabia where the water temperature may reach 40°C and, even more astonishing, in the thermal soda springs of Lake Magadi in Kenya, where the temperature of waters or rather of the soda liquor, ranges from

27°C to 49°C. With very few exceptions The Dead Sea, which is too salty to support any form of life, is a notable one—wherever there is water, there will be fish. As is only to be expected, there is within this huge group, conditioned by this fantastic variety of habitats, vast diversity of fishes.

Adapted to particular surroundings, or specialised ways of life the following fishes are unique:



Fig 1
The climbing Fish

fishes which fly. As a matter of fact, the flying fish does not fly: it glides. It does so by holding the pectoral fins (in some cases also the pelvic fins) stiffly out. Before it can take to the air it has to attain a high speed in the water and it is this speed that maintains the glide, which only lasts for a few seconds.

Many deep sea fishes are self-luminous, producing their own light. It is not always easy to understand why they should do so? But in the Lantern fishes the significance would seem to be sexual; for the light of the female shines downwards, that of the male upwards. There can be no doubt that the light is used as a lure for prey.

Tree-climbing is something one would certainly not expect in fish. But the climbing Perch of India has been found quite high up in trees. In this fish there are sharp spines on the lower parts of the gill-covers and these are spread out alternately and fixed into the ground, shove being given by the pectoral fins and the tail (Fig. 1).

The experts at staying out of water are the Lung fishes of Africa and South America. They can do so for months on end, because they have true lungs in addition to gills, the swim bladder being a well developed lung.

It is commonly thought that flying fish are the only

The flesh of a number of fishes is poisonous to humans. That of the Muki-Muki of Hawaii, for example has often been used by those wishing to commit suicide. Presumably, the flesh of some fishes will be poisonous to other fishes.

Many fishes are capable of producing discharge of high voltage, and in these cases the electricity is used not only in defence but also, and more usually, for offence. The best known example is Electric Eel. The Electric Eel is an inhabitant of South American rivers. Electric Eels use their batteries to stun other fishes, which can then be eaten at leisure.

Nothing is more terrible than the sting that arms the tail of Trygon (the sting Ray of the Mediterranean), called Pastinaca by the Latins, which is five inches long. When driven into the root of a tree it causes it to wither. It can pierce armour like an arrow, it is as strong as iron, yet possesses venomous properties. The venom of the Weevers (Trachinus) is particularly virulent, and a person who has had the misfortune to step on one of these fishes when bathing will not forget his experience in a hurry.

A Butterfly fish, in which the dark ground colour of the head, and body is broken up by a series of narrow curved white stripes, the caudal fin being ornamented with markings of a similar nature. In a specimen which made its appearance in the fish-market at Zanzibar these markings on the fin bore a resemblance to old Arabic characters reading on one side

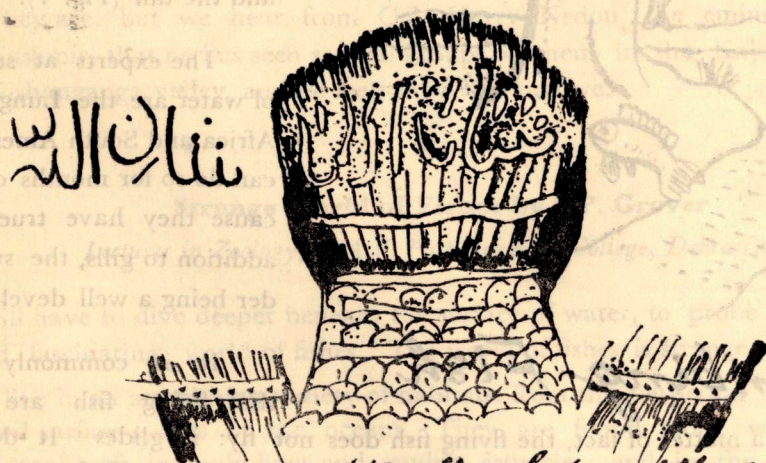


Fig. 2 Tail of a Butterfly fish with markings resembling Arabic characters

of the tail 'Lailaha Illalah' (There is no God but Allah) and, on the other side 'Shani Allah' (A warning sent from Allah) (Fig. 2). This caused considerable excitement and the fish, which was originally sold for a penny, eventually fetched five thousand rupees.

Practically all fishes adopt a horizontal position when swimming, but one or two species depart from this normal attitude. The vertical position of Sea Horse has a great resemblance, with Shrimp fishes or Needle-fishes, which are curious creatures, with the long compressed body encased in a thin bony cuirass with a knife like lower edge. On occasions, however, it has been observed to move in the normal horizontal attitude, and even vertically, but upside down! A Cat fish from the Nile and other African rivers has adopted the remarkable habit of floating or swimming leisurely at the surface of water with the belly upwards, an attitude taken up by no other fish unless it be sick or dead.

Reviews

Animal Twilight: Man and Game in Eastern Africa, By J.L. Cloudsley-Thompson, (1967 G.T. Foulis, London, 204 pp., Sh. 36/-).

From the old stone-ages to the days of tourism by Cook and Boeing, here is a readable account of human-animal contacts in Africa, written by a Professor of Zoology at Khartoum University.

Humorous and interesting period-drawings by Kipling and Livingstone liven the somewhat stereo-type portraits of African wildlife with which we have become familiar. The test itself is interesting.

The cruelty and ingeniousness of African hunting techniques, as well as the results of man's depredations on the continent are well brought-out. The advent of fire-arms and white settlers, as well as 'white hunters', conservationists, and to-days relationships are further explained, with the latter half of the book devoted to animals themselves. Game conservation rounds off the species-wise discussion of animals in an excellent addition to the wildlife literature of Africa.

Editor.

*

*

*

*

South America and Central America, By Jean Dorst (1967, Random House, New York, 300 pp., 20 dollars).

Head of the Department of Mammals and Birds of the famous Natural History Museum of France, and Vice-Chairman of the Survival Service Commission of IUCN, the author has here produced a very attractive volume describing and explaining the varied habitats of the rich landmass of South America. To quote Tom Harrisson, "A fine gift, a handsome book, a delicious read."

Editor.

*

*

*

*

The Red Book: Wildlife in Danger By James Fisher, Noel Simon and Jack Vincent (1969, Collins, 368 pp., 70 Sh.).

Based on the Red Data Book so well produced and kept up-to-date by the Survival Service Commission of the IUCN, this book is the gist of urgent problems in the saving of the species, as Darwin's was of their origin !

Photographs and illustrations are the strongest points of this unique volume, and yet its weakest, too, for rare and endangered species are hardly likely to be easy to draw, paint or

photograph. 100 species are shown in colour, and 100 in black-and-white, and their status and problems discussed in some detail.

Though plants and reptiles have not been adequately dealt with, this is a gap in our compilations, for even the Red Data Books have not covered these fully yet. The whole philosophy of the survival service to animals and birds threatened with extinction is that it is easier to find support for ad-hoc problems and concrete threats to specific wildlife, rather than for the whole, wider concept of conservation. This is the way in which this book serves a really useful purpose, concentrating in one important document, all such cases. The thin end of the conservation wedge, one might call it!

This is the book which should be made compulsory reading for our leaders and foresters and civil servants, as it focusses attention in practical terms.

Hari Dang.

* * * *

Vanishing Wild Animals of the World By Richard Fitter (1968, Mid. and Bank, and Kaye and Ward, 144 pp., 30 Sh.).

Noel Simon's Red Data Book, compiled for the Survival Service Commission of the IUCN is again the source-material for this excellent little book on mammals.

Mr. Fitter is Hon. Secretary of the Fauna Preservation Society, and has obviously had access to information not available to everyone. He has made good use of it, in a volume which covers the field of why animals begin to disappear, what can be, and has been, done to save them, as in the now-well-known case of the Arabian oryx. Mr. Fitter makes generous acknowledgement to the work of other conservationists, and those of us, particularly in India, who have seen their original work shamelessly plagiarised and pinched by arm-chair authors, will admire him for his integrity. Of course, not all specialists will agree with Mr. Fitter's belief in 'conservation by captive breeding' but there is no gainsaying the utility in selected instances of such a desperate method.

One point raised in this context is the failure of the translocation of the Sumatran rhinoceros, which further depleted the stock in Sumatra of this rare species, while other experiments in Africa succeeded.

In general terms, this is a book for the layman as well as the specialist, though often overlapped by The Red Book of Messrs Fisher, Vincent and Simon. The idea of getting a Bank to promote such books is worth emulating in India, as that is what has brought down the price to a mere 30 Sh. for such an excellent book.

Hari Dang.

Correspondence

Depredations by wild animals in Mysore

Reports are received of wild elephants destroying food crops in Chamarajanagar area and of hyenas in Barabanki carrying away twenty-five children in Haidergarh and Siddhaur villages. We also hear frequently of vast depredations by monkeys in fruit and vegetable gardens. To control the latter menace in the city the Commissioner of the Corporation some time ago adumbrated his plan of capturing the unwelcome simians with the help of tranquiliser darts and releasing them after surgically neutering them. A similar proposal was made by another humanitarian of introducing special contraceptive technique for insect control. Another eminent person suggested that all stray dogs be rounded up and sexes separated and confined till natural death in separate enclosures to prevent procreation of the unwanted animals. I wonder how far these Utopian schemes were successful in reducing these pests. It is however obvious from the present reports of large-scale depredations to human lives and food crops that the results of these paper schemes have miserably failed in their objectives. Let us be realistic in our approach to these hard everyday problems to evolve practicable solutions.

Now that large tracts of forest land, the natural habitat of wildlife, are being appropriated for meeting the growing needs of the increasing human population in our country, a feasible solution seems to be to capture the excess pachyderms, and other wild beasts, by some humane procedure and transfer them to the wildlife sanctuaries wisely set apart for the purpose in several parts of our country. Even here the number of animals need to be limited depending on the extent of shelter and food available. The reduction should be effected not by permitting amateur shooting, trapping, poison baiting or other cruel methods but by expert cullers of the wildlife department, who should expeditiously dispose off the undesired surplus with the minimum of suffering to the creatures.

Yours etc.,
Dr. A.S. Venkatachalam,
8, Bride Street,
Richmond Town,
Bangalore-25.

Sir,

I read with great interest if not complete agreement your papers on Himalayan fauna. In particular, I enjoyed your study of musk deer, which must be rated very high with the

reports of foreign experts, as a pioneer contribution. But I wonder why you have not been able to ensure complete ban on the export of musk.

..... like to suggest that you should use more photographic illustrations to make your papers readable.

Yours etc.,

Kr. Brijendra Singh,
of Kapurthala.

*

*

*

Sir,

We are considering the possibility of musk-farming for production of this valuable commodity and would be grateful to receive from you data and suggestions on the most suitable areas which our committee should visit for deciding upon a suitable site in the Himalayas.

Yours etc.,

Dr. Bhagwan Dash,
Department of Health,
Ministry of Health,
Family Planning and Urban Development,
New Delhi.

*

*

*

Sir,

I gather from the District Magistrate, Almora, that there is a man-eating leopard in his district doing great damage. Could you give me fuller details, please ?

Your etc.,

'Tootoo' Imam,
The Wild Sports of India,
Hazaribagh.

*

*

*

Sir,

I congratulate you on the poem in the May issue, 1969, on ibex. It was excellent. I liked it very much. I did my Master's Degree in English Literature, and should know what I am talking about. It had rhapsody, nostalgia and philosophy.

Yours etc.,

B.N.S. Deo,
of Korea,
Bangalore.

*

*

*

Sir,

I am one of your staunchest supporters, but must confess myself disappointed by the thin and dull May issue of CHEETAL. If you are short of material, you should advertise. Why don't you use a good office-assistant who can do this kind of work on a salary, instead of doing all your own work? Surely, organisations and the governments of states and the centre will help you?

Yours etc.,
A Subscriber,
Calcutta.

*

*

*

Dear Sir,

Now that they have chosen the lion as the National animal of our country this will be an excellent opportunity to press Government to shift the heartless maldharis from the Gir forest to save the lions being poisoned or otherwise molested. We must also lodge a strong protest against appropriation of forest land for other purposes. Hereunder a news extract from a local paper intimating the taking over of 4000 acres of forest land for rehabilitating Tibetan refugees.

.....North Kanara has had 4,000 acres of land set aside for settling 1,200 Tibetan families near Belgaum. The forest land will be used for cultivation.....

Yours etc.,
A.S. Venkatachalam,
8, Bride Street,
Richmond Town,
Bangalore-25.

~~~~~

Yours etc.,  
B.N.S. Dco  
of Kotra  
Bangalore



## List of Journals received on Exchange basis

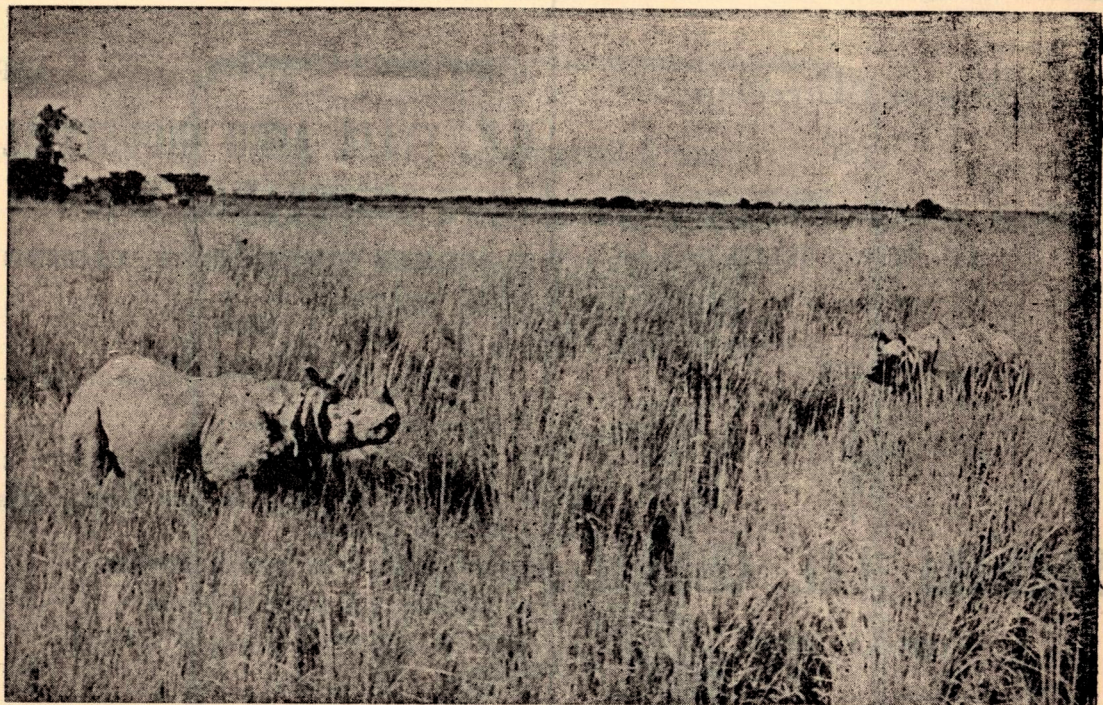
1. Audubon.
2. Alberta—Land Forest, Park and Wild Life.
3. Animal Citizen.
4. Aranya (U.P. Forest Department).
5. The Conservationist.
6. Hornbill (Bombay Natural History Society).
7. The Gazelle. (Journal of Wild Life Club, Shillong).
8. Journal of Bengal Natural History Society.
9. I.T.I. Magazine, Banglare.
10. Living Wilderness.
11. The Peacock. (Indian Ornithological Garden, Dharangadhra).
12. Loris (Wild Life Preservation Society of Ceylon).
13. The Society of Malawi Journal.
14. Living Wilderness.
15. Scottish Forestry.
16. Vanshri.
17. Ocrotirca, Naturii, Romania.
18. Ochrona, Przyrody, Poland.
19. K.Y.H., U.S.A.



**Buy from the Wild Life Preservation Society of India**  
**7, Astley Hall, Dehra Dun.**

|                                                                                                                                         |     |       |     |           |
|-----------------------------------------------------------------------------------------------------------------------------------------|-----|-------|-----|-----------|
| (1) Greeting Card—in colour with pictures of Peacock, White Tiger, Panther, Tiger, Pochards, and Lion. Card suitable for all occasions. | ... | Price | Re. | 0.75 each |
| (2) Society's Tie (with Cheetal head in gold on green silk)                                                                             | ... | ,,    | Rs. | 12.00 ,,  |
| (3) Society's Blazer Brass Buttons with Cheetal head (small and large)                                                                  | ... | ,,    | Rs. | 12.00 doz |
| (4) Society's Writing Pads and Covers (2 pads with 100 covers)                                                                          | ... | ,,    | Rs. | 11.00 ,,  |
| (5) Balance of Nature Game (for members)                                                                                                | ... | ,,    | Rs. | 6.00 ,,   |
| (6) Society's Cheetal Head Lapel Badge                                                                                                  | ... | ,,    | Rs. | 2.00 ,,   |
| (7) Tourists' guide to Sanctuaries and National Parks in India                                                                          | ... | ,,    | Re. | 0.25 ,,   |
| (8) Singh Parivar (in Hindi)                                                                                                            | ... | ,,    | Rs. | 3.00 ,,   |
| (9) Panther on the Prowl                                                                                                                | ... | ,,    | Rs. | 3.25 ,,   |
| (10) National Parks by K.S. Sankhala, I.F.S. (Published by W.L.P.S.I.)                                                                  | ... | ,,    | Rs. | 6.00 ,,   |





*Welcome to ;*

## **JALDAPARA WILD LIFE SANCTUARY**

**Best time to visit—NOVEMBER TO APRIL**

**Situation**—Alipur, Jalpaiguri District, West Bengal.

**Scenic Beauty**—River Torsa with nine Tributaries flows through the riverine forest of the sanctuary.

**Wild Life Attraction**—See the world famous Indian one-horned Rhinoceros in natural habitat and also Elephants, Royal Bengal Tigers, Panthers, Bison, Sambhar, Cheetal and India's National Bird—the Peacock and a variety of Bird Life.

**Area**—Thirty-six sq miles near Bhutan border.

**Railway Station** :—Hashimara,—only two km. from Tourist Bungalow, Barodabri.

**Air Strip**—Hashimara, Bi-weekly Air Service from Calcutta. Motor from Cooch Behar or Bagdogra on Air Service from Calcutta.

Forest Department Jeep and Elephants available to tourists on hire.

**Accommodation** :—Modern Tourist Bungalow with catering arrangements at reasonable charges of Rs. 15/-per day per person inclusive of Lodging, Bed Tea, Breakfast, Lunch, Afternoon Tea and Dinner.

**Information and Reservation from** :—THE DIVISIONAL FOREST OFFICER,  
Cooch Behar Division, P.O. Cooch Behar (W. Bengal),

*Telephone* :—Cooch Behar 27.



Hearty Greetings

TO

THE X I.U.C.N. CONFERENCE  
AT NEW DELHI

from



**SARDARI LAL OBERAI**

**DEHRA DUN**

AGRO

AGRO

AGRO

**U.P. STATE AGRO INDUSTRIAL  
CORPORATION LTD.**

**22, VIDHAN SABHA MARG, LUCKNOW.**

*Corporation's main activities at present are:—*

1. Assembly of Tractors.
2. Manufacture of Agricultural Implements.
3. Servicing of Tractors and Implements at Farmer's Door.
4. Maintenance of Repair Workshops.
5. Processing & Canning of Fruits & Vegetables
6. Distribution of Chemical Fertilizers.



For  
fast relief from  
**ACIDITY, STOMACH UPSETS**  
take **PACHNOL**



Pachnol helps you feel better at once. The special herbal formula eases discomfort quickly, and gives long-lasting relief.

*Hamdaed*





**ROSES \* ROSES \* ROSES**

**DUMRAON ROSES**

**are strong, hardy & lasting**

*Buy your Rose Plants from*

**Dumraon Nurseries**

**DUMRAON E. Rly., BIHAR**

Choiceest Selection o

**H.T., FLORIBUNDA, MINIATURES  
AND CLIMBERS**

Catalogue available on request.

*With Best Compliments*

*from*

**STYLE**

**TAILORS OUTFITTERS**

**13-E, Connaught Place,**

**NEW DELHI.**

The Wild Life Preservation Society of India is dedicated to  
preserve the wild things of Nature  
and

We, similarly, are dedicated to preserve and save the innumerable  
Human Lives

by manufacturing finest Quality of :

**HEAD & TAIL LIGHT BULBS**

for

**Cars, Trucks, Scooters, Motor Cycles, etc.**



**THE MINIATURE BULB INDUSTRIES OF INDIA**

**DEHRA DUN**

Widest range of Automobile & other Miniature Bulbs !





Visiting DEHRA DUN ?

Stay at

**MOTEL**

*Kwality*

- Most centrally situated.
- Delightfully furnished rooms, both air-conditioned and non air-conditioned.
- Spacious lounge also available for conferences.

---

**COME ON THE  
MOST EXCITING  
'SHIKAR' IN YOUR LIFE..  
WHERE THE ONLY  
'WEAPON' YOU'LL HAVE TO  
'SHOOT' WITH WILL BE  
YOUR CAMERA !**

Capture rare and unusual sights in extensive game sanctuaries like Corbett Park, Kanha and Kaziranga !

Spend a delightful time in the wilds with modern comforts and a retinue of servants.



Contact :

**MERCURY TRAVELS (I) PVT. LTD.**

New Delhi : Jeevan Tara Building, Gate No. 4-A, Parliament Street.

Bombay : 70, Forbes Street, Rampart Row Corner.

Calcutta : C/o Hotel Oberoi Grand.

Madras : Mohan Mansion, 38, C, Mount Road.

Srinagar : C/o Hotel Oberoi Palace.

---



---

FOR A DATE WITH THE TIGER

*Visit*

**THE SARISKA GAME SANCTUARY**

122 MILES FROM DELHI

ON THE

**DELHI — JAIPUR ROAD,**

AND

COMPLETE THE ROUND

BY VISITING

**THE BHARATPUR BIRD SANCTUARY**

*A DELIGHT FOR BIRD LOVERS*

1. For Sariska Game Sanctuary, contact the Game Warden, Sariska, Phone No. 5
2. For Bharatpur Bird Sanctuary, contact the Divisional Forest Officer, Bharatpur.

---

*Issued by the Govt. of Rajasthan*

---



## APPLICATION FORM

### The Wild Life Preservation Society of India

7, Astley Hall, Dehra Dun.

I, ..... of .....

.....  
hereby apply to be admitted as a Life/Ordinary/Professional (1) Educational/Family/Affiliated/  
Institutional/Student Member of the Wild Life Preservation Society of India.

My interests are.....

Name.....

Designation .....

Address.....

#### MEMBERSHIP

- |                                                                                                          |   |                                                                                |
|----------------------------------------------------------------------------------------------------------|---|--------------------------------------------------------------------------------|
| 1. Patron                                                                                                |   | Rs. 500 and above.                                                             |
| 2. Life :                                                                                                |   | Rs. 150.00 and above.                                                          |
| 3. Ordinary:                                                                                             |   | Rs. 20.00 Entrance fee + Rs. 12.00 subscription per annum.                     |
| 4. Professional:<br>(Foresters, Agricultural Workers,<br>Soil Conservationists, WildLife<br>Managers)    | } | 50% of Ordinary Members.                                                       |
| 5. Educational:<br>(Teachers and Trainers)                                                               |   | 50% of Ordinary Members.                                                       |
| 6. Student:                                                                                              |   | 50% of Ordinary Members. No Entrance Fee.                                      |
| 7. Family:<br>(Applies to 3, 4 and 5 above)                                                              |   | Twice Ordinary Members. No Entrance Fee.                                       |
| 8. Affiliated:<br>(Other similar bodies)<br>Institutional<br>(Messes, Units, Schools, Colleges,<br>etc.) | } | Five times the Ordinary Member, i.e., Rs. 60.00 with 5 votes. No Entrance Fee. |



Contributions, donations and gifts may be sent direct to the Wild Life Preservation Society of India, 7, Astley Hall, Dehra Dun, U.P.

For those who wish to become benefactors by Will to the Society, the following form is respectfully suggested:

### FORM OF BEQUEST

I, \_\_\_\_\_ bequeath to the Wild Life Preservation Society of India, Dehra Dun, for the general purposes of the Society the sum of Rs.....(free of all duties payable at my death, and the receipt of the Honorary Secretary for the time being of the Society shall be a sufficient discharge of such legacy.

Note: If the benefaction is intended for some specific phase of the Society's work the same may be indicated in the bequest. Wills must be signed by the Testator and attested by two witnesses in the presence of the Testator and of each other.



Greetings to

THE DELEGATES I.U.C.N. X G.A. MEETING NOVEMBER, 1969

FROM

**KUMAR TRADING Co.**

Transport Contractors & Suppliers

**75, GANDHI ROAD, DEHRA DUN.**

Phone : 3552

---

*Instruments For*

**SURVEYING, AIR SURVEY, FORESTRY**

**AND DRAWING**

Can be had

FROM

**DRAWING INSTRUMENTS MFG. COMPANY**

**Behari Lal Road, DEHRA DUN**

— — — — REPAIRS UNDERTAKEN — — — —



*With Compliments*

*from*

**R. S. Bhola Ram & Sons Pri. Ltd.**

**MORIGATE, DELHI-6**

*Branches:—*Arya Samaj Rd.  
Karolbagh,  
NEW DELHI.

Petrol Pump:  
Alipur Road,  
DELHI.

---

**Greetings**

TO

DELEGATES TO THE INTERNATIONAL UNION FOR CONSERVATION  
OF NATURE AND NATURAL RESOURCES, NOVEMBER 1969

*From*

The Oldest Establishment of the Town

**KISHEN LAL & CO.**

**Chemists & Wine Merchants**

**DEHRA DUN**



*Wild Life Preservation is a Duty of all citizens*

*of course it is a Mark of Citizenship*

**Hearty Welcome To All Delegates**

**NARENDRA & COMPANY**

**Gandhi Road,  
DEHRA DUN.**

Telephone : 3740

Telegram : PASTURE.

---

FOR ALL KINDS OF  
BLASTING EXPLOSIVES AND BLASTING ACCESSORIES  
AND FOR ALL PROBLEMS IN BLASTING

*Please Contact*

**DOON UDYOG PRI. LTD.**

**56, Gandhi Road, Dehra Dun.**

*Distributors For*

**Messrs INDIAN DETONATORS LTD.**

*The Pioneer Manufacturers of all kinds of Explosives in India with American collaboration*

**KUKATPALLI, HYDERABAD.**



*By appointment to*  
**Dr. Zakir Husain, President of the Republic of India**

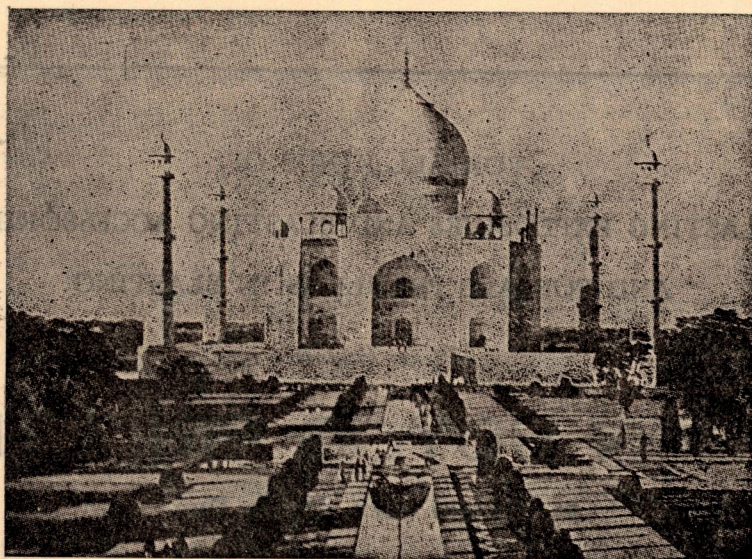
# **INDIAN HANDICRAFTS EMPORIUM**

**HANDICRAFTS WORKSHOP**

**MANUFACTURERS & EXPORTERS**

**JEWELLERY - CARVED IVORY - EMBROIDERY - BRASSWARES - WOOD CARVINGS - SILK -  
SAREES - KASHMIR GOODS - OLD MINIATURE PAINTINGS - CURIOS**

**ON VIEW THE REPLICA OF WORLD'S FAMOUS  
TAJ MAHAL**



**5, Main Mehrauli Road, (Near Qutab Minar)  
NEW DELHI - 30 (INDIA)**

**Phones : Office—73714, 79371**

**Res. : 72744**





VISIT  
**LION  
SANCTUARY  
GUJARAT  
STATE**

Specially arranged  
Lion shows, Panther,  
Cheetal, Sambhar,  
Nilgai and variety of  
other animals and  
birds. Hot water  
springs of Tulsisham  
and beauty spots,  
such as Kanakai,  
Baneja and others.

For further particulars please contact :—SANCTUARY SUPERINTENDENT,  
Sasan, Gir, Distt, Junagadh, Gujarat State,  
Phone—Visavadar : 60.

**Greetings**

TO  
DELEGATES TO THE  
INTERNATIONAL UNION  
FOR CONSERVATION OF  
NATURE AND NATURAL  
RESOURCES—NOV. 1969

FROM

**Kishan Brothers**

*TAILORS AND DRAPERS*

*Saree Specialists*

DEHRA DUN

WITH BEST COMPLIMENTS FROM:

**MALTEX**

**CHEMICAL & ALLIED INDUSTRIES**

MALTEX HOUSE, CLEMENT TOWN,  
DEHRA DUN (U.P.)

*Manufacturers of :*

**Finest quality Malt, Malt Extract  
and  
Krunchy Kornflakes**

Telephone: Clement Town Civil—42



# PALAMAU NATIONAL PARK



- \* 168 K.M. from Ranchi and 24 K.M. from Daltonganj. Served by an excellent all weather road.
- \* Well equipped and electrified Forest Rest House at Betla. Other Forest Rest Houses at Kerh and Kechki.
- \* A modern 4 roomed tourist lodge and a canteen are expected to be ready shortly at Betla.
- \* Jeep & Guides available.
- \* Varied wild life including the Gaur and Elephants. Excellent opportunities for day light photography.

*For reservations and other details please contact :*  
**THE DIVISIONAL FOREST OFFICER,**  
**Daltonganj South Division,**  
**Daltonganj P.O., District Palamau.**



*Greetings*

TO

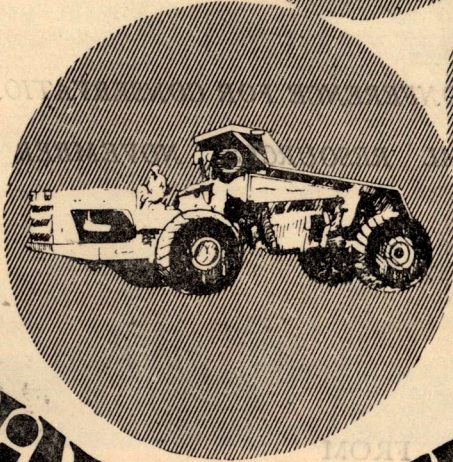
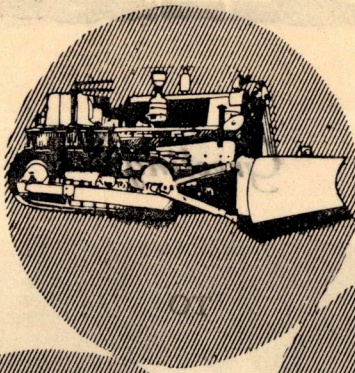
*THE INTERNATIONAL CONFERENCE FOR CONSERVATION OF  
NATURE AND NATURAL RESOURCES, NOVEMBER 1969*

FROM

JUGAL KISHORE JAI PRAKASH  
JAI PRAKASH GOYAL BROS. & CO.  
BAIJ NATH GOYAL & CO.  
HIMPINE INDUSTRIES

Serving the Country by Exploiting Conifer  
Forests Mechanically.



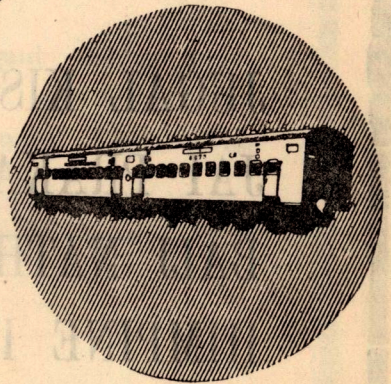


# Moving With The Times

**EARTH-MOVING EQUIPMENT FROM  
BHARAT EARTH MOVERS LTD.**

**Manufacturers of:**

- D 120 Tractors (235 HP)
- D 80 Tractors (165 HP)
- D 50 Tractors (90 HP)
- 'C' Tournapull Scrapers (14.7 C.yd.)
- Haulpak Rear Dump Trucks (35 Tons)
- Motor Graders (110 HP)
- and also
- Integral Broad Gauge Railcoaches.



**BHARAT EARTH MOVERS LTD., BANGALORE-17**  
**SHAPING THE FUTURE**



## Wild Life Preservation Society of India

1. The aims and objects of the Society are as follows:

- (a) To promote interest in and impart knowledge regarding the preservation and conservation of all forms of wild life, particularly among the youth of the country.
- (b) To co-operate with the Govts. of India and States and with other Societies and Institutions having similar aims and objects in working for the interests of wild life.
- (c) To assist in enforcing and actively supporting the Forest Acts, Wild Birds and Animals Protection Acts and Rules etc. of States and the Indian Arms Act and Rules in so far as they pertain to wild life and to bring to the notice of the authorities any infringement of the same and to assist in the detection and prosecution of offenders in respect of such laws.
- (d) To advise and help the Govt. and wild life administrators in the formation, maintenance and protection of Sanctuaries and National Parks, the preservation of wild life in general and rare species of India in particular and in the introduction of exotic species into the country, the rehabilitation of rare species etc. and in the revision on rational lines of the shooting and fishing rules, so as to conserve and increase wild life stocks.
- (e) To raise funds for the carrying out of the above aims and objects and to found and maintain museums, reading rooms and libraries of natural history in order to disseminate knowledge regarding wild life.
- (f) To promote sportsmanship in shikar and to recognise well regulated shooting and fishing, as a means of preserving wild life and fish so that through wise use the surplus may provide a recreational asset to the nation.
- (g) To carry out publicity and propaganda for the preservation of wild life in India by means of monographs, journals, films, film strips and other feasible methods.
- (h) To assist members of the Society in obtaining shooting and fishing facilities and facilities for viewing and photographing wild life in India.
- (i) To conduct research into the problem of Wild Life management in India, and in pursuance of this, to initiate, encourage and, where possible, assist in projects for the study of threatened species and related subjects and to provide reference and research facilities for such work.
- (j) To carry on such other activities which will serve the above subjects.

### What membership of Wild Life Preservation Society of India will entitle you to ?

1. You will become an active member of the growing number of wildlife enthusiasts, who enjoy working for and spreading the knowledge of how to conserve India's heritage of Wild Life for posterity.
2. You will be entitled to the full use of the Library of the Wild Life Preservation Society and of its reading room.
3. You will receive a membership certificate.
4. You will receive a personal Identification and Membership card.
5. You will be entitled to buy all publications of the Society at a concession rate.
6. You will be entitled to buy at concession rates the Society's Greeting Cards, Calendars, Tie, Lapel Badge and the Balance of Nature Game (specially Published in colour for its educative and recreational value).
7. You will be supplied CHEETAL, the half yearly journal of the Society free.



# Wild Life Preservation Society of India

DEHRA DUN



*Patron-in-Chief :*

Shri V. V. Giri, President of India

*President :*

His Highness Maharaja Pratap Singh Malvendra of Nabha

*Executive Vice-President :*

Shri S. S. Negi (Retd. Conservator of Forests)

*Hony. Secretary & Treasurer :*

Dr. R. N. Misra

*Asstt. Hony. Secretaries :*

1. Dr. S. K. Sangal

2. The Secretary, Wild Life Club, F. R. I. & Colleges

## **Delhi Branch**

*President :*

H. H. the Maharaja Pratap Keshari Deo of Kalahandi

*Hony. Secretary :*

Shri Y. N. Gupta

## **Assam Branch (Shillong)**

*President :*

H. H. the Maharaja of Charkhari

*Hony. Secretary :*

Mr. M. A. Islam, I.F.S.

## **Bihar Branch (Monghyr)**

*President :*

Kumar Surendra Singh

*Hony. Secretary :*

Prof. A. A. Khan

## **Editorial Board**

1. Shri Hari Dang (Hony. Editor).
2. Shri S.S. Negi.
3. Dr. R.N. Misra.
4. Shri R.D. Singh.
5. Dr. S.K. Sangal.